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HANDBOOK

STANDARD INSTALLATION INSTRUCTIONS

A19-864

CONTROL TOWER FACILITY

AIRPORT CONTROL TOWER CONSOLE AN/FRC-19B; RADIO SET AN/GRC-32B; RADIO TRANSMITTERS BC-625-AM, BC-640-D, T-282/GR, T-217A/GR; RADIO RECEIVERS R-278B/GR, R-361/GR, BC-639, BC-624-C

(CORVEY ENGINEERING CO.)

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i	1 November 1957
ii	1 November 1957
iii	1 November 1957
iv	1 November 1957
v	1 November 1957
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TABLE OF CONTENTS

SECTION Page

I GENERAL DESCRIPTION

1-1. Purpose and Scope of Handbook 1
1-3. Purpose of Facility 1
1-5. Description of Facility 1
1-8. Capabilities. 1
1-10. Limitations 1
1-12. Electrical Characteristics. 1
1-13. Transmitters and Receivers 1
1-14. Power Requirements for Facility 1
1-15. Description of Major Components 1
1-16. Radio Transmitter T-282/GR. 1
1-17. Radio Transmitter T-217A/GR. 4
1-18. Radio Transmitter BC-640-D. 4
1-19. Radio Set AN/GRC-32B. 4
1-23. Radio Transmitter BC-625-AM. 9
1-24. Radio Receiver BC-624-C 9
1-25. Radio Receiver R-361/GR 11
1-26. Radio Receiver R-278B/GR 11
1-27. Radio Receiver BC-639. 11
1-28. Control Indicator C-806/GR. 12
1-29. Airport Control Tower Console AN/FRC-19B 13
1-30. General 13
1-31. Control Tower Console CY-888/CRC. 13
1-38. Field Condition Indicator ID-203/CRC 19
1-39. Electrical Equipment Cabinet CY-1293/FSA-4. 19
1-40. Control Panel SB-270/FSA-4 19
1-41. Interconnecting Group OA-447/FSA-4 20
1-42. AF Amplifier AM-864/U 20
1-43. AF Amplifier AM-447A/G 20
1-44. Sound Recorder-Reproducer RD-142/UN 20
1-45. Demagnetizer MX-1724/UN 20
1-46. Principles of Operation. 22

II LOGISTICAL DATA

2-1. Introduction 24
2-2. Purpose and Scope 24
2-2. A. SFEL Requirements 24
2-2. B. Directory of Equipment 24
2-3. Physical Characteristics 31
2-5. Transportation and Materials Handling 31
2-8. Related Items 31
2-9. Power 31
2-10. Buildings 32
2-12. Antenna Supports 33
2-13. Cable Requirements 33
2-14. Quartz Crystals 33
2-15. Kollsman Altimeter 33
2-17. Reference Documents 33

III INSTALLATION ENGINEERING

3-1. Introduction 36
3-2. Purpose of Section 36
3-4. C-E Scheme 36

TABLE OF CONTENTS—Continued

SECTION Page

III INSTALLATION ENGINEERING—Continued

3-6. Site Selection. 36
3-7. General 36
3-11. Siting Criteria 36
3-14. Plot Size 37
3-15. Site Survey 37
3-17. Leases, Licenses, Permits, and Agreements 38
3-18. Environmental Considerations 38
3-20. Construction Priority 38
3-22. Receiver-Site Construction 38
3-23. Plot Plan 38
3-24. Clearing the Plot 38
3-25. Fencing 38
3-26. Access Road 38
3-27. Use of Existing Buildings 38
3-28. Receiver Building 38
3-29. Cable Hangers 38
3-30. Power Load 38
3-31. Power Facilities 40
3-34. Fuel Facilities. 40
3-35. Intersite Control Cables 40
3-36. Antenna Pole Installation 40
3-38. Transmitter-Site Construction 40
3-39. Plot Plan 40
3-40. Clearing the Plot 40
3-41. Fencing 40
3-42. Access Road 40
3-43. Use of Existing Buildings 40
3-44. Transmitter Building 40
3-45. Cable Hangers 42
3-46. Power Load 42
3-47. Power Facilities 42
3-50. Fuel Facilities 42
3-51. Intersite Control Cables 44
3-52. Antenna Pole Installation 44
3-54. Air-Traffic-Control-Tower Construction 44
3-55. General 44
3-56. Cab Lighting 44
3-57. (Deleted) 44
3-58. Power-Transfer Unit for Emergency Air-Traffic-Control Lamps 44
3-59. Control Panel for Local Standby Equipment 44
3-60. (Deleted) 44
3-61. Power Load 44
3-62. Power Facilities 44
3-66. Fuel Facilities 46
3-67. Intersite Control Cables 47
3-71. Telephone Facilities 47
3-73. Obstruction Lighting and Marking 48
3-75. Antenna Mounting Brackets 48

IV INSTALLATION INSTRUCTIONS

4-1. Introduction 49
4-5. Tools and Test Equipment 52
4-7. Allied Construction Requirements 52
4-8. General 52
4-9. Receiver Site. 52
4-10. Transmitter Site 52
4-11. Air-Traffic-Control-Tower Site 52
4-12. Miscellaneous 52

TABLE OF CONTENTS—Continued

SECTION Page

IV INSTALLATION INSTRUCTIONS—Continued

4-13. Installation Procedures . . . 52
4-14. Equipment Identification and Sorting . . . 52
4-16. Receiver-Site Installation . . . 59
4-17. General . . . 59
4-18. Unpacking Receiver-Site Equipment . . . 59
4-19. Assembly of Rack MT-686/GR . . . 59
4-22. Attaching Electrical Conduit MX-1174/U to Rack MT-686/GR . . . 60
4-24. Installation of Electronic Equipment in Receiver Building . . . 61
4-26. Cable and Wiring Installation . . . 64
4-28. Installation of Antennas . . . 77
4-30. Transmitter-Site Installation . . . 88
4-31. General . . . 88
4-32. Unpacking Transmitter-Site Equipment . . . 88
4-33. Assembly of Rack MT-686/GR . . . 88
4-34. Attaching Electrical Conduit MX-1174/U to MT-686/GR Racks . . . 88
4-35. Installation of Electronic Equipment in Transmitter Building . . . 88
4-37. Cable and Wiring Installation . . . 91
4-39. Installation of Antennas . . . 104
4-41. Installation in Air-Traffic-Control-Tower Equipment Room . . . 108
4-42. General . . . 108
4-43. Unpacking Equipment-Room Equipment . . . 108
4-44. Installation of Electronic Equipment, Wiring, and Antennas . . . 108
4-46. Installation in Air-Traffic-Control-Tower Cab . . . 124
4-47. General . . . 124
4-48. Unpacking Cab Equipment . . . 124
4-49. Installation of Equipment and Wiring . . . 124
4-51. Installation of Field Condition Indicators . . . 149
4-53. Intersite Control-Cable Connections . . . 151
4-54. General . . . 151
4-55. Material . . . 151
4-56. Connections in Control-Tower Equipment Room and Transmitter Building . . . 151
4-57. Connections in Control-Tower Equipment Room and Receiver Building . . . 152
4-58. Test Procedures . . . 153
4-59. Receiver Site . . . 153
4-61. Radio Receiver BC-639 . . . 153
4-62. Radio Receiver R-361/GR . . . 156
4-63. Radio Receiver R-278B/GR . . . 161
4-64. Transmitter Site . . . 164
4-66. Radio Transmitter BC-640-D . . . 165
4-67. Radio Transmitter T-282/GR and Modulator-Power Supply MD-141A/GR . . . 178
4-68. Radio Transmitter T-217A/GR and Modulator-Power Supply MD-129A/GR . . . 183
4-69. Air-Traffic-Control-Tower Site . . . 187
4-71. Airport Control Tower Console AN/FRC-19B . . . 187
4-72. Radio Set AN/GRC-32B (Modified) . . . 197
4-77. Radio Receiver BC-624-C, Radio Transmitter BC-625-AM . . . 200

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1.	Control-Tower Facility	X
1-2.	Line-of-Sight Operation	1
1-3.	Radio Transmitter T-282/GR and Modulator-Power Supply MD-141A/GR	2
1-4.	Antenna AT-197/GR	4
1-5.	Radio Transmitter T-217A/GR	5
1-6.	Modulator-Power Supply MD-129A/GR	5
1-7.	Control Indicator C-806/GR	6
1-8.	Antenna Equipment RC-81-C	6
1-9.	Radio Transmitter BC-640-D, Front View	7
1-10.	Radio Set AN/GRC-32B	8
1-11.	Installation of Radio Set AN/GRC-32B in Rack	9
1-12.	Radio Transmitter BC-625-AM, Top View	10
1-13.	Rectifier RA-62-C with Line Cord	10
1-14.	Rack FT-244-A, Center Cover Removed, Top View	11
1-15.	Antenna AN-188	12
1-16.	Radio Receiver BC-624-C, Top View	12
1-17.	Installation of Radio Transmitter BC-625-AM and Radio Receiver BC-624-C in Rack	13
1-18.	Radio Receiver R-361/GR	14
1-19.	Radio Receiver R-278B/GR	15
1-20.	Radio Receiver BC-639, Front View	16
1-21.	Rectifier RA-42-B	17
1-22.	Frequency Meter BC-638-A with Antenna in Place, Front View	17
1-23.	Airport Control Tower Console AN/FRC-19B	18
1-24.	Field Lighting Control Group OA-228/CRC	18
1-25.	Meteorological Indicator Group OA-118/CRC	18
1-26.	Flight Data Indicator Group OA-117/CRC	19
1-27.	Communications Group OA-119/CRC	19
1-28.	Control-Monitor Group OA-115/CRC	19
1-29.	Control Panel SB-270/FSA-4	19
1-30.	Power Supply PP-1453/FSA-4	20
1-31.	Interconnecting Group OA-447/FSA-4	21
1-32.	AF Amplifier AM-864/U	22
1-33.	AF Amplifier AM-447A/G	22
1-34.	Sound Recorder-Reproducer RD-142/UN and Demagnetizer MX-1724/UN	23
3-1.	Plot Plan—Remote Receiver or Transmitter Site	38
3-2.	Cable Hanger Locations—Receiver Building	39
3-3.	Antenna Pole Plans and Details for Remote Transmitter and Receiver Sites	41
3-4.	Cable Hanger Locations—Transmitter Building Type A	42
3-5.	Cable Hanger Locations—Transmitter Building Type B	43
3-6.	Control-Tower-Console Lighting Fixtures—Location and Wiring	45
3-7.	Telephone Cabling Requirements	46
3-8.	Field-Condition-Indicator Lines	47
3-9.	Type A and Type D Antenna Mounting Brackets	48
4-1.	Assembly of Rack MT-686/GR	59
4-2.	Attaching Electrical Conduit MX-1174/U to Rack MT-686/GR	61
4-3.	Receiver-Building Equipment Layout—Type A Building	63
4-4.	Equipment Layout—Racks No. 31, No. 50, and No. 51	64
4-5.	Cutout Detail—Rack No. 31	65
4-6.	Equipment Layout—Racks No. 1, No. 2, and No. 3	66
4-7.	Cable Connections for Radio Receiver BC-639	67
4-8.	Cable Connections for Radio Receiver R-361/GR	67
4-9.	Cable Connections to Distribution Panel J-390/GR in Rack No. 1 and Rack No. 2	67
4-10.	Cable Connections for Radio Receiver R-278B/GR	68

LIST OF ILLUSTRATIONS—Continued

Figure	Title	Page
4-11.	Cable Connections to Distribution Panel J-390/GR in Rack No. 3	68
4-12.	Audio Cabling Between Racks in Receiver Building	69
4-13.	Interconnecting Group OA-447/FSA-4, Rear View	70
4-14.	Radio Receiver BC-639—Audio Output Connections	71
4-15.	Telephone Terminal Chambers in Receiver Building	74
4-16.	Mounting Panel MX-1125/G, Rear View	74
4-17.	Rack No. 50—Identification of Jacks	78
4-18.	Antenna Masts—Antenna Installation Details (Sheet 1 of 2)	80
4-18.	Antenna Masts—Antenna Installation Details (Sheet 2 of 2)	81
4-19.	Installation of Plug PL-306 on Coaxial Cable RG-34/U	82
4-20.	Type A and Type D Antenna Mounting Brackets	83
4-21.	Antenna Equipment RC-81-C	83
4-22.	Antenna Equipment RC-81-C, Tubing Lock and Radiator Assembly	84
4-23.	Installation of Connector Plug UG-495/U on Coaxial Cable RG-17/U	85
4-24.	Antenna AT-197/GR	86
4-25.	RG-34/U Coaxial Cable Routing—Receiver Building	87
4-26.	RG-17/U Coaxial Cable Routing—Receiver Building	87
4-27.	Transmitter Building Equipment Layout, Type A Building	89
4-28.	Transmitter Building Equipment Layout, Type B Building	90
4-29.	Equipment Layout—Racks No. 31 through No. 33, No. 50, and No. 51	91
4-30.	Equipment Layout—Racks No. 1, No. 2, and No. 3	92
4-31.	Name-Tag Designations for Control Panels SB-270/FSA-4	93
4-32.	Cable Connections for Radio Transmitter T-282/GR	93
4-33.	Cable Connections to Distribution Panel J-390/GR in Racks No. 1 and No. 2	93
4-34.	Cable Connections for Radio Transmitter T-217A/GR	94
4-35.	Cable Connections to Distribution Panel J-390/GR in Rack No. 3	95
4-36.	Audio Cabling Between Racks in Transmitter Building	95
4-37.	Terminal Board E701 on Transmitter BC-640-D	97
4-38.	Telephone Terminal Chambers in Transmitter Building	98
4-39.	Electrical Equipment Cabinet CY-1293/FSA-4, Rear View	100
4-40.	Special-Purpose Electrical Cable Assembly CX-2261/U	101
4-41.	CX-2261/U Cables 4201L, 4202L, 4203L, 4204L, and 4205L—Jumper Connections	102
4-42.	CX-2261/U Cables 4201R, 4202R, 4203R, 4204R, and 4205R—Jumper Connections	103
4-43.	Rack No. 50—Identification of Jacks	105
4-44.	RG-34/U Coaxial Cable Routing—Transmitter Building	107
4-45.	RG-17/U Coaxial Cable Routing—Transmitter Building	107
4-46.	(Deleted)	108
4-47.	Cable Assembly Instructions	109
4-48.	Control-Tower Equipment Room—Equipment Layout	111
4-49.	Equipment Layout—Racks No. 1, No. 2, and No. 3	112
4-50.	Operating Control Panel—Radio Set AN/GRC-32B	113
4-51.	Installation of Radio Set AN/GRC-32B in Rack No. 4, Schematic Arrangement	114
4-52.	Installation of Transmitter BC-625-AM and Radio Receiver BC-624-C in Rack No. 5, Schematic Arrangement	115
4-53.	Transmitter-Receiver Assembly, Top View	116
4-54.	Transmitter BC-625-AM, Top View	117
4-55.	Radio Receiver BC-624-C, Top View	117
4-56.	Antenna Installation—Control-Tower Roof	119
4-57.	Antenna AN-188	121
4-58.	Control-Tower Equipment Room—Audio Cabling Between Racks	121
4-59.	Audio Input Terminals—Recorder RD-142/UN	121
4-60.	Telephone Terminal Chambers—Control-Tower Equipment Room	124
4-61.	Rack No. 1—Identification of Jacks	125
4-62.	Control Tower Console CY-888/CRC—Equipment Layout	126
4-63.	Control-Monitor Group OA-115/CRC (Front Cover Removed)	129
4-64.	Console Base Plate—Cutout Details	129
4-65.	Communications Group OA-119/CRC (Front Cover Removed)	129
4-66.	Flight Data Indicator Group OA-117/CRC (Front Cover Removed)	130
4-67.	Meteorological Indicator Group OA-118/CRC (Front Cover Removed)	130
4-68.	Field Lighting Control Group OA-228/CRC (Front Cover Removed)	130
4-69.	Locations of Console Base Plates and Supplementary Cabinets—Control-Tower Cab	131
4-70.	Control Tower Console CY-888/CRC—Assembly Details	132

LIST OF ILLUSTRATIONS—Continued

Figure	Title	Page
4-71.	Audio Cabling Between Cab and Equipment Room in Control Tower	133
4-72.	Intergroup Connection Diagram	136
4-73.	Installation of Copper Tubing and Muffler Assembly for Kollsman Altimeter	137
4-74.	Field Lighting Control Group OA-228/CRC—Power Terminal Board	139
4-75.	Field Lighting Control Group OA-228/CRC—External Connection Panel	139
4-76.	Meteorological Indicator Group OA-118/CRC—External Connection Panel	141
4-77.	Loudspeaker Muting Control Unit C-792/CRC—Terminal Board Connections	141
4-78.	Communications Group OA-119/CRC—Auxiliary Transmitter Line Terminal Unit	143
4-79.	Control Monitor Group OA-115/CRC—Transmitter Line Terminal Unit	144
4-80.	Control Monitor Group OA-115/CRC—Power Terminal Board	145
4-81.	OA-228/CRC and OA-115/CRC Groups—Transmitter Control Panels A and B	145
4-82.	OA-118/CRC Group—Receiver Control Panel	145
4-83.	(Deleted)	146
4-84.	Schematic Wiring Diagram for Emergency Control Lamp Power Transfer Unit	147
4-85.	Cable Connections to PL-169 Plugs	148
4-86.	Cable Assembly	148
4-87.	(Deleted)	149
4-88.	Field Condition Indicator ID-203/CRC	150
4-89.	Field Condition Indicator ID-298/CRC	151
4-90.	Radio Receiver BC-639	154
4-91.	AF Amplifier AM-864/U	155
4-92.	Radio Receiver R-361/GR	157
4-93.	Radio Receiver R-361/GR, Top View, Dust Cover Removed	158
4-94.	Radio Receiver R-361/GR, Crystal and Oven Assembly	159
4-95.	Radio Receiver R-278B/GR	162
4-96.	Radio Transmitter BC-640-D, Front View	166
4-97.	Amplifier Panel PN-8-C, Top View	167
4-98.	Oscillator Panel PN-9-C, Top View	168
4-99.	Amplifier Panel PN-8-C, Internal View Showing Shorting Bars	169
4-100.	Amplifier Panel PN-8-C, Showing Grid-Line Shorting Bar	170
4-101.	Oscillator Panel PN-9-C, Front View	171
4-102.	Power Control Panel PN-13-C, Front View	172
4-103.	Control Panel PN-11-B, Front View with Switch Cover Plate Removed	173
4-104.	Modulator Panel PN-10-C, Front View	174
4-105.	Amplifier Panel PN-8-C, Front View	175
4-106.	Radio Transmitter T-282/GR and Modulator-Power Supply MD-141A/GR	179
4-107.	Radio Transmitter T-282/GR, Oven Assembly and Crystal	180
4-108.	Radio Transmitter T-217A/GR	183
4-109.	Modulator-Power Supply MD-129A/GR	184
4-110.	Interconnecting Group OA-447/FSA-4	190
4-111.	Control Indicator C-806/GR	191
4-112.	Control Indicator C-806/GR, Front Panel Open	192
4-113.	(Deleted)	194
4-114.	(Deleted)	195
4-115.	(Deleted)	196
4-116.	(Deleted)	196

LIST OF TABLES

Table	Title	Page
1-1.	Electrical Characteristics of Transmitters	2
1-2.	Electrical Characteristics of Receivers	3
2-1.	Typical Bill of Material, Control-Tower Facility	24
2-2.	Component List, Radio Set AN/GRC-32B	31
2-3.	Component List, Airport Control Tower Console AN/FRC-19B	31
2-4.	Shipping Data, Control-Tower Facility	32
2-5.	Radio Receiver BC-624-C, Crystal Harmonics	33
3-1.	Environmental Limits for the Control-Tower Facility	38
3-2.	Receiver-Building Power Requirements	39
3-3.	Receiver-Building Generator Requirements	40
3-4.	Transmitter-Building Power Requirements	43
3-5.	Transmitter-Building Generator Requirements	44
3-6.	Control-Tower Power Requirements	45
4-1.	Installation Sequence for Receiver Site	49
4-2.	Installation Sequence for Transmitter Site	50
4-3.	Installation Sequence for Control-Tower Equipment Room	50
4-4.	Installation Sequence for Control-Tower Cab	51
4-5.	Installation Sequence for Intersite Control Cable Connections	51
4-6.	Test and Adjustment Sequence for Control-Tower Facility	51
4-7.	Tool and Test Equipment Requirements	52
4-8.	Typical BOM for Receiver-Site Installation	53
4-9.	Typical BOM for Transmitter-Site Installation	54
4-10.	Typical BOM for Control-Tower-Equipment-Room Installation	56
4-11.	Typical BOM for Control-Tower-Cab Installation	57
4-12.	Material Supplied to Assemble Rack MT-686/GR	59
4-13.	Material Supplied to Attach One Electrical Conduit MX-1174/U to Rack MT-686/GR	60
4-14.	Typical BOM for Installation of Electric Equipment in Receiver Building	62
4-15.	Typical Receiver Building Cable and Wiring BOM	65

LIST OF TABLES—Continued

Table	Title	Page
4-16.	Cable Connections from Rack No. 31 to Rack No. 50	69
4-17.	Cable Connections from Rack No. 1 to Rack No. 50	71
4-18.	(Deleted)	72
4-19.	Cable Connections from Rack No. 2 to Rack No. 50	72
4-20.	Cable Connections from Rack No. 2 to Telephone Chamber No. 2 in Cabinet D	72
4-21.	Cable Connections from Rack No. 51 to Rack No. 50	72
4-22.	Internal Cable Connections in Rack No. 50	75
4-23.	Equipment Schedule for Receiver-Building Power Panel	76
4-24.	Typical BOM for Installation of Antennas at Receiver Site	79
4-25.	Typical BOM for Installation of Electronic Equipment in Transmitter Building	88
4-26.	Typical BOM for Installation of Cable and Wiring in Transmitter Building	91
4-27.	Cable Connections from Racks No. 31, No. 1, No. 2, and No. 3 to Rack No. 50	96
4-28.	Cable Connections from Rack No. 3 to Telephone Chamber No. 2 in Telephone Cabinet C	97
4-29.	Cable Connections from Rack No. 51 to Rack No. 50	98
4-30.	Internal Cable Connections in Rack No. 50	99
4-31.	Equipment Schedule for Transmitter-Building Power Panel	102
4-32.	Typical BOM for Installation of Antennas at Remote Transmitter Site	106
4-33.	Typical BOM for Installation of Electronic Equipment, Wiring, and Antennas in Control-Tower Equipment Room	110
4-34.	Typical Cable Connections between Rack No. 1 and Rack No. 2	120
4-35.	Cable Connections from Rack No. 3 to Rack No. 1	122
4-36.	Internal Connections for Rack No. 1	122
4-37.	Power Panel Equipment Schedule for Control-Tower Equipment Room	123
4-38.	Typical BOM for Installation and Wiring of Electronic Equipment in Control-Tower Cab	127
4-39.	Intergroup Connecting Cables	135
4-40.	Receiver Cable Connections Between Rack No. 1 (Control-Tower Equipment Room) and Meteorological Indicator Group OA-118/CRC (Control-Tower Console)	140
4-41.	Transmitter Cable Connections Between Rack No. 1 (Control-Tower Equipment Room) and Groups OA-119/CRC and OA-115/CRC (Control-Tower Console)	142
4-42.	Material Supplied for Installation of Field Condition Indicators	149

SECTION I
GENERAL DESCRIPTION

1-1. PURPOSE AND SCOPE OF HANDBOOK.

1-2. This handbook briefly describes the standard Control Tower Facility, lists its components and parts, gives engineering instructions needed for installation planning, and sets forth detailed installation procedures. For further information, such as maintenance instructions and detailed theory of operation, consult the reference publications listed in Section II.

1-3. PURPOSE OF FACILITY.

1-4. This facility provides a means of uhf and vhf ground-to-air communications, primarily for the control and guidance of aircraft traffic. A typical installation is illustrated in Figure 1-1.

1-5. DESCRIPTION OF FACILITY.

1-6. The facility consists of equipment and housing for a number of uhf and vhf communication channels, with operational control centered in an air traffic control tower. The main transmitters are located at a remote site and the main receivers at another remote site. Standby receiver-transmitters are located in the control tower.

1-7. This facility makes the following channels available for two-way voice communication between aircraft and the control tower:

a. Four remote active channels in the uhf range (225-400 mc).

b. One remote backup channel in the uhf range (225-400 mc).

c. One local standby channel in the uhf range (225-400 mc).

d. One remote active channel in the vhf range (100-156 mc).

e. (Deleted)

f. One local standby channel in the vhf range (100-156 mc).

1-8. CAPABILITIES.

1-9. The facility is capable of establishing radiotelephone communication between the control tower and one or more aircraft at line-of-sight distances on uhf and vhf channels (225 mc to 400 mc and 100 mc to 156 mc). After the equipment at the transmitter and receiver sites has been started and readied for remote operation, it is capable of unattended operation. Means are provided for recording the receiver and transmitter outputs of all five active communication channels.

1-10. LIMITATIONS.

1-11. The communication range of the facility is normally limited to "line-of-sight" distances (Fig. 1-2), owing to the inherent properties of uhf and vhf wave propagation. Physical obstructions in the line-of-sight path and radio and electrical interference in proximity to the receivers can prevent satisfactory communication. This is particularly true if the site does not meet the minimum siting criteria given in Section III.

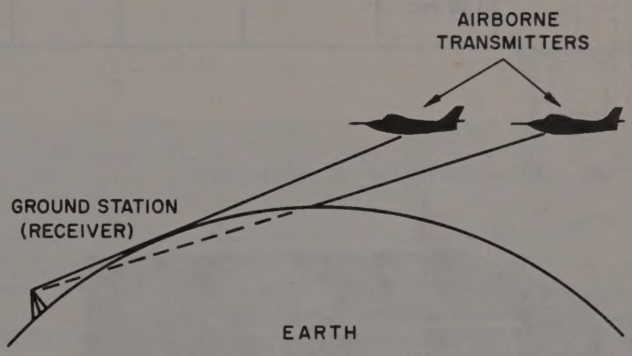


Figure 1-2. Line-of-Sight Operation

1-12. ELECTRICAL CHARACTERISTICS.

1-13. TRANSMITTERS AND RECEIVERS. Table 1-1 shows electrical characteristics of the transmitters and Table 1-2 shows electrical characteristics of the receivers.

1-14. POWER REQUIREMENTS FOR FACILITY. The combined power requirements at the transmitter site, receiver site, control-tower site constitute the total requirements for the facility. These are discussed in Section III.

1-15. DESCRIPTION OF MAJOR COMPONENTS.

1-16. RADIO TRANSMITTER T-282/GR. Radio Transmitter T-282/GR (Fig. 1-3) is a single-channel, crystal-controlled unit, which obtains modulation and power from Modulator-Power Supply MD-141A/GR (Fig. 1-3). The transmitter has a normal output power of 100 watts in the 225- to 400-mc range and can be tone- or voice-modulated. The transmitter feeds Antenna AT-197/GR (Fig. 1-4). Electrical characteristics are shown in Table 1-1.

TABLE 1-1

ELECTRICAL CHARACTERISTICS OF TRANSMITTERS

Type Transmitter	Frequency Range	Channels	Output Power	Type Emission	Frequency Control	Antenna	Type Modulator	Approx. Power Requirements
T-282/GR	225 mc to 400 mc	1 Preset	100 watts	A2, A3	Crystal	AT-197/GR	M-141A/GR	115/230V 50/60 cps Single phase 1250 watts
T-217A/GR	225 mc to 400 mc	10 Preset	100 watts	A2, A3	Crystal	AT-197/GR	MD-129A/GR	115/230V 50/60 cps Single phase 1620 watts
BC-640-D	100 mc to 156 mc	1 Preset	50 watts	A2, A3	Crystal	RC-81-C	P/O Transmitter	115/230V 50/60 cps Single phase 860 watts
AN/GRC-32B (RT-178/-ARC-27)	225 mc to 400 mc	18 Preset, 1 Guard	10 watts	A1, A3	Crystal	AT-197/BR	P/O RT/178	115/230V 50/60 cps Single phase 500-1000 watts
BC-625-AM	100 mc to 156 mc	4 Preset	8 watts	A3	Crystal	AN-188	P/O BC-624-C	115/230V 50/60 cps Single phase 150-300 watts

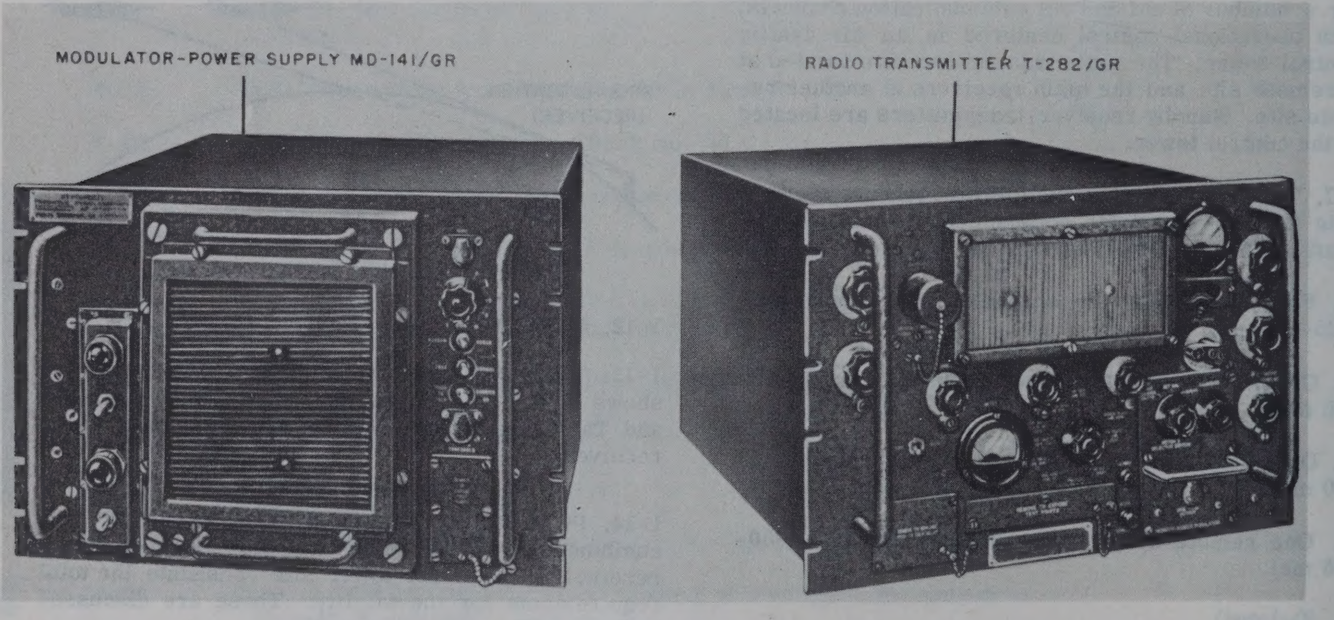


Figure 1-3. Radio Transmitter T-282/GR and Modulator-Power Supply MD-141A/GR

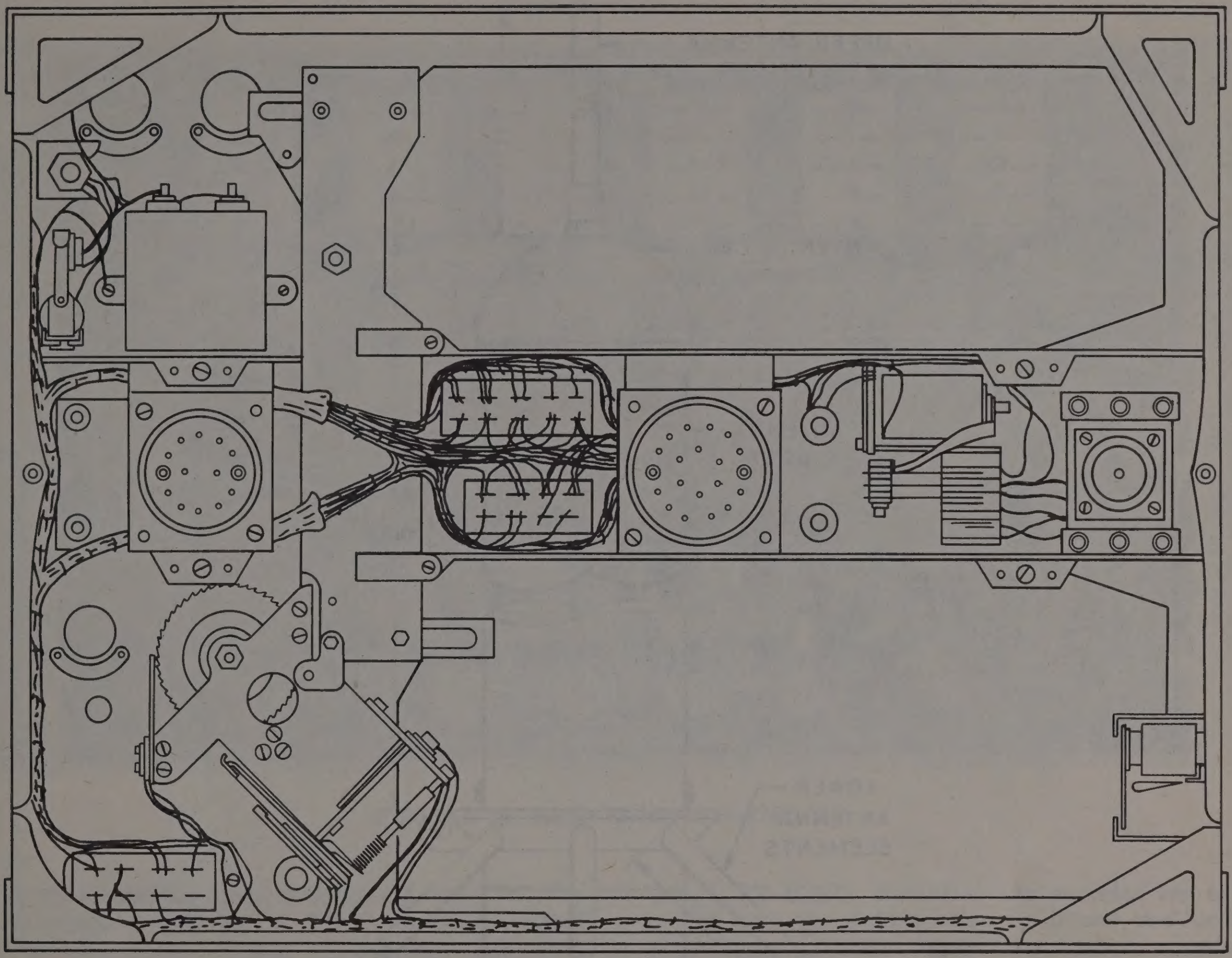


Figure 1-14. Rack FT-244-A, Center Cover Removed, Top View

1-25. RADIO RECEIVER R-361/GR. Radio Receiver R-361/GR (Fig. 1-18) is a crystal-controlled, single-channel receiver covering the 225- to 400-mc range for reception of amplitude-modulated radiotelephone or radiotelegraph signals. Channel selection is accomplished by manually changing the oscillator crystal and retuning the r-f and oscillator sections of the receiver. Electrical characteristics are shown in Table 1-2.

1-26. RADIO RECEIVER R-278B/GR. Radio Receiver R-278B/GR (Fig. 1-19) is a crystal-controlled, multi-channel receiver designed to provide reception of amplitude-modulated radiotelephone or radiotelegraph signals on any one of 1,750 channels in the 225- to 400-mc range. A MANUAL and ten other channels can be preset, selected, and automatically positioned at the receiver, or any one of the ten preset frequencies can be remotely selected from Control Indicator C-806/GR. Electrical characteristics are shown in Table 1-2.

NOTE

Radio Receivers R-278/GR, R-278A/GR, and R-278B/GR are basically the same receiver. Radio Receiver R-278B/GR, however, does not incorporate the guard channel receiver. Where R-278/GR or R-278A/GR is installed, the guard channel receiver is not used.

1-27. RADIO RECEIVER BC-639. Radio Receiver BC-639 (Fig. 1-20) is a master-oscillator-controlled, manually-tuned receiver capable of receiving cw or amplitude-modulated radiotelephone or radiotelegraph signals on any frequency in the 100- to 156-mc range. No power supply is built into the receiver, but provision is made for connection to an external unit, such as Rectifier RA-42-B (Fig. 1-21). Electrical characteristics of the receiver are shown in Table 1-2. Frequency Meter BC-638-A (Fig. 1-22) is supplied with this facility for calibration of Radio Receiver BC-639.

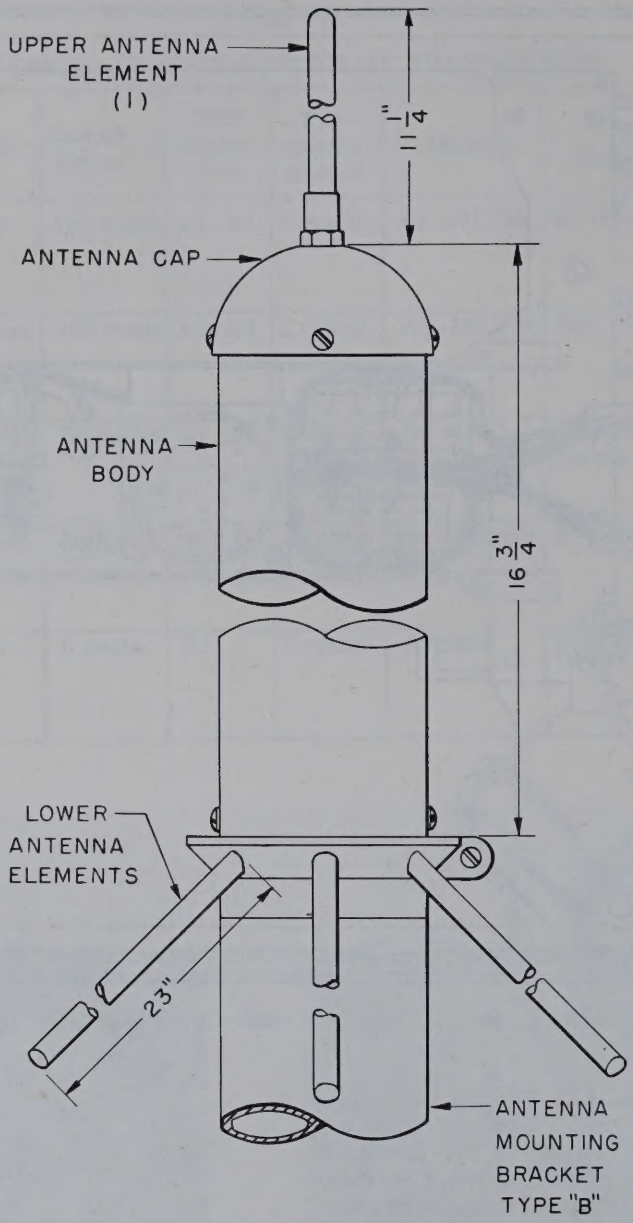

UPPER ANTENNA ELEMENT (1)
11 1/4"
ANTENNA CAP
ANTENNA BODY
16 3/4"
LOWER ANTENNA ELEMENTS
23"
ANTENNA MOUNTING BRACKET TYPE "B"

Figure 1-15. Antenna AN-188

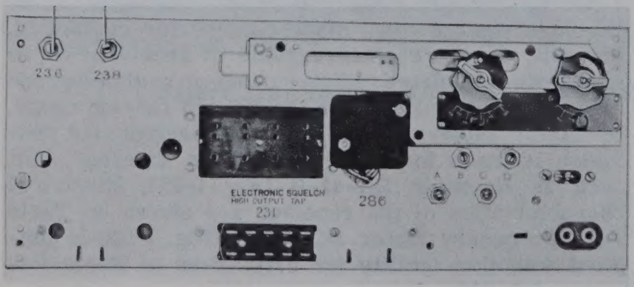

236
238
ELECTRONIC SQUELCH
HIGH OUTPUT TAP
231
286
A
B
C
D

Figure 1-16. Radio Receiver BC-624-C, Top View

1-28. **CONTROL INDICATOR C-806/GR.** Control Indicator C-806/GR (Fig. 1-7) indicates the modulation of Radio Transmitter T-217A/GR by visual and aural means at the control-tower cab and provides channel selection for one Radio Transmitter T-217A/-GR and one Radio Receiver R-278B/GR. The indicator includes a monitor jack, a microphone jack, and a headset jack, which permit modulating and monitoring the transmitter and listening to the receiver. Only the channel selection facility is used in control tower system installations.

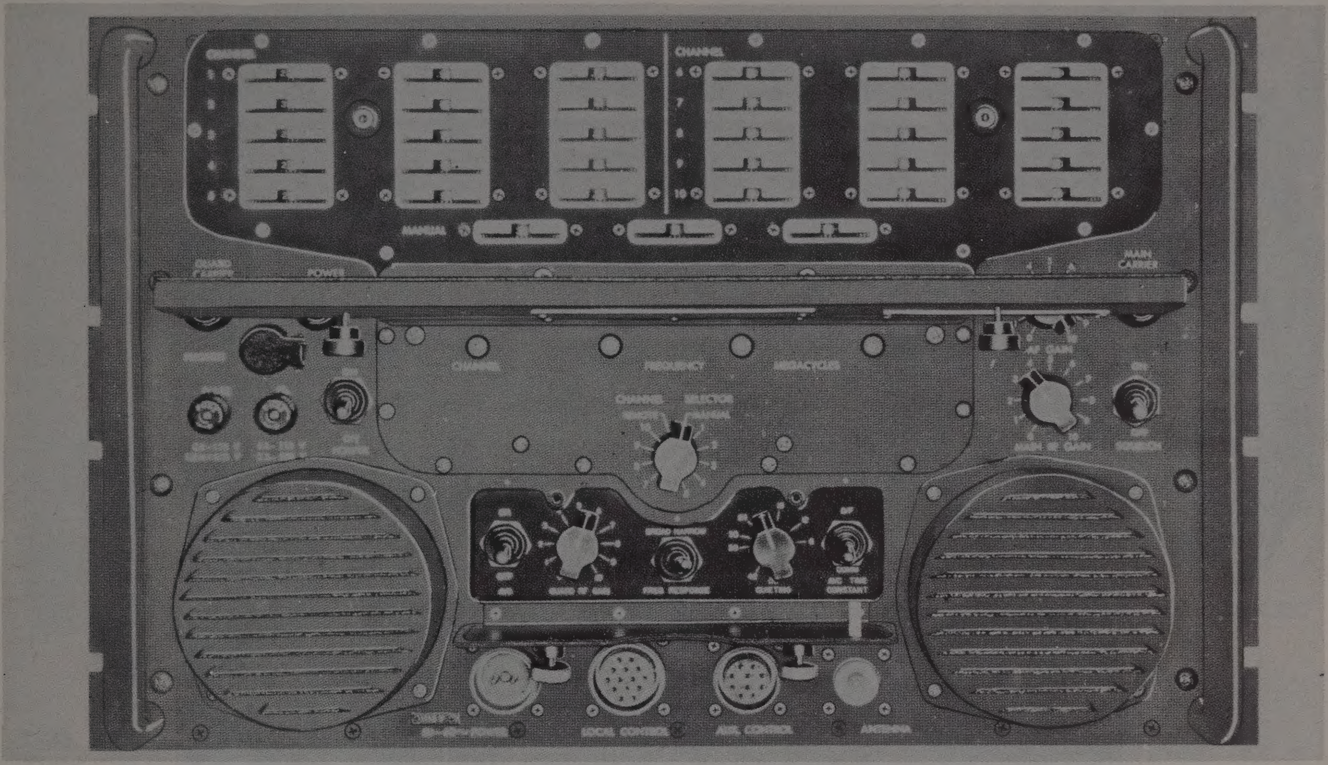


Figure 1-19. Radio Receiver R-278B/GR

1-33. Field Lighting Control Group OA-228/CRC (Fig. 1-24) includes Cabinet CY-889/CRC, Control Panel C-796/CRC, Power Supply PP-523/CRC, and three Dynamic Speakers LS-173/CRC. Facilities are provided for two-way radiotelephone communication with aircraft from position A. In addition, power for the console and overhead lighting is controlled by this group. An adapter panel is provided for installation of a field-lighting control panel (not supplied with this facility).

1-34. Meteorological Indicator Group OA-118/CRC Fig. 1-25) includes Cabinet CY-884/CRC, Control Panel C-792/CRC, Indicator Control C-791/CRC, and three Dynamic Speakers LS-173/CRC. Facilities are provided for mounting a wind speed and direction indicator and Kollsman altimeter setting indicator. Other provisions of this group include controls for the regulation of the 12 loudspeakers and their associated indicator lamps, the equipment required for receiver muting (quieting) and an adapter panel for installation of a 102A telephone key system switch panel in the desk shelf.

1-35. Flight Data Indicator Group OA-117/CRC (Fig. 1-26) includes Cabinet CY-885/CRC and Flight Data Board PT-102/U. Facilities are provided for indicating time and field-weather conditions, and for the recording and filing of weather and flight information.

1-36. Communications Group OA-119/CRC (Fig. 1-27) includes Cabinet CY-887/CRC, Mounting Panel SB-417/FRC, Transmitter Control C-1525/FRC, and three Dynamic Speakers LS-173/CRC. There are no operating controls in this group. However, there are provisions for mounting a telephone key panel and telephone subsets. Facilities are provided for remote operation of radiotelephone transmitters on channels 1 through 4.

1-37. Control-Monitor Group OA-115/CRC (Fig. 1-28) includes Cabinet CY-886/CRC, Transmitter Control C-793/CRC, two AF Amplifiers AM-365/CRC, and three Dynamic Speakers LS-173/CRC. Facilities are provided for two-way radiotelephone communication with aircraft from operating position B. In addition, equipment is provided for remote operation of radiotelephone transmitters on channels 5 through 12 and line amplification of the output of both A and B position microphones.

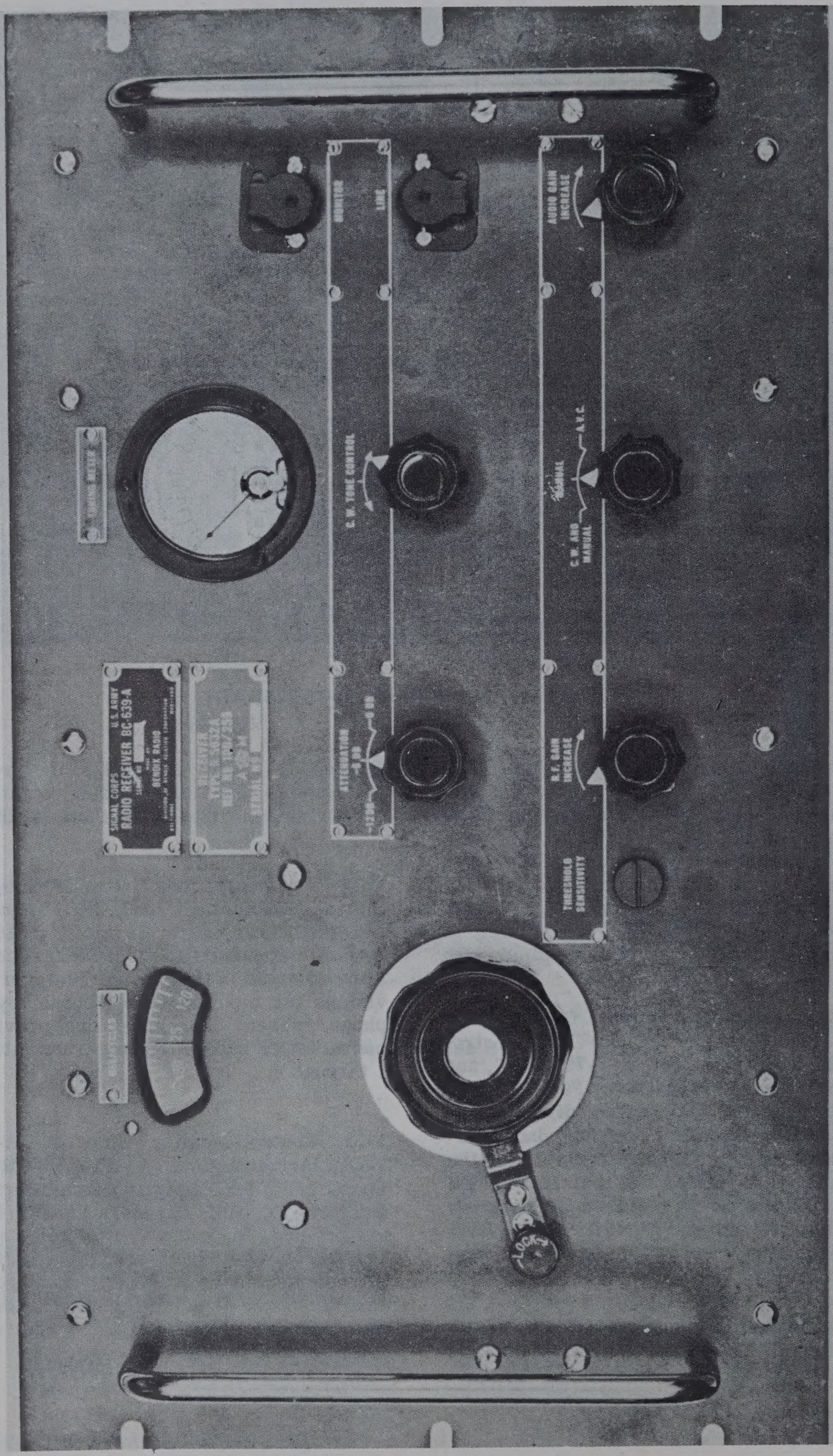

MONITOR
LINE
AUDIO GAIN INCREASE
C.W. TONE CONTROL
C.W. AND MANUAL
SIGNAL
A.V.C.
ATTENUATION
R.F. GAIN INCREASE
THRESHOLD SENSITIVITY
SIGNAL CORPS U.S. ARMY
RADIO RECEIVER BC-639-A
BENDIX RADIO
LOCK

Figure 1-20. Radio Receiver BC-639, Front View

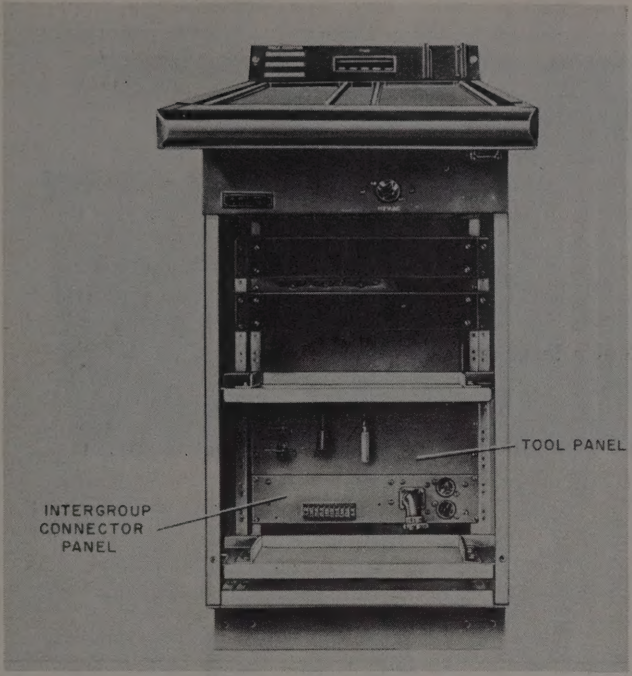

TOOL PANEL
INTERGROUP CONNECTOR PANEL

Figure 1-26. Flight Data Indicator Group OA-117/CRC

1-38. FIELD CONDITION INDICATOR ID-203/CRC. Field Condition Indicator ID-203/CRC (Fig. 1-23), normally installed at the Air Base Weather Office, is used to indicate flying conditions at the field and to relay this information to the field-condition indicator in the control-tower console and Field Condition Indicator ID-298/CRC (Fig. 1-23) at the Base Operations Office.

1-39. ELECTRICAL EQUIPMENT CABINET CY-1293/FSA-4. Electrical Equipment Cabinet CY-1293/FSA-4 (Fig. 1-23) is a standard rack approximately 76-1/2 inches high, 22 inches wide, and 18 inches deep, located in the transmitter building equipment room. It is factory wired and provides facilities for mounting and connecting the six transmitter control panels and a power supply.

1-40. CONTROL PANEL SB-270/FSA-4. Control Panel SB-270/FSA-4 (Fig. 1-29) has two separate, identical circuits. Facilities are provided to key and make audio connections for two separate transmitters.

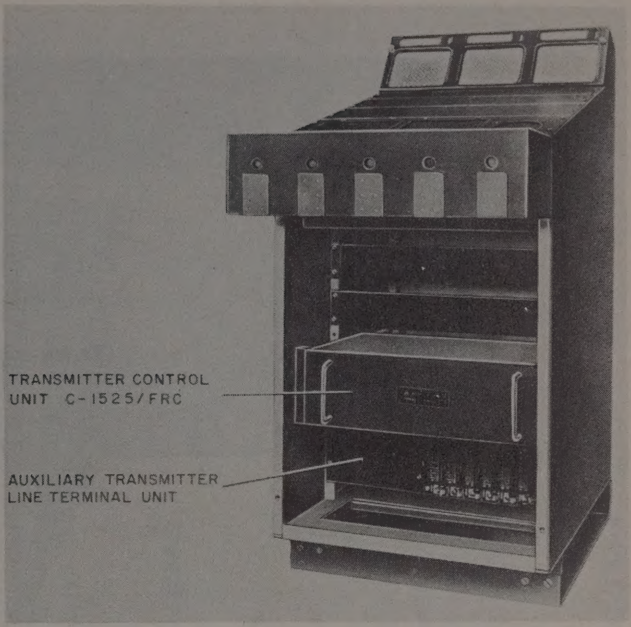

TRANSMITTER CONTROL UNIT C-1525/FRC
AUXILIARY TRANSMITTER LINE TERMINAL UNIT

Figure 1-27. Communications Group OA-119/CRC

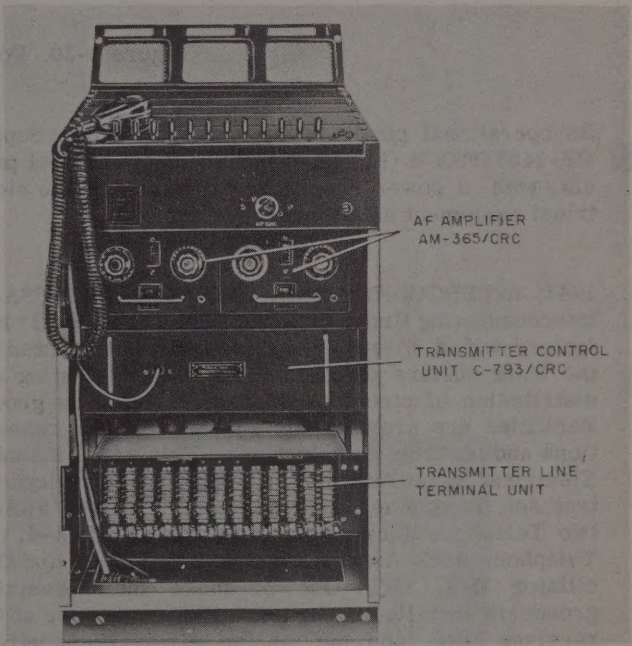

AF AMPLIFIER AM-365/CRC
TRANSMITTER CONTROL UNIT C-793/CRC
TRANSMITTER LINE TERMINAL UNIT

Figure 1-28. Control-Monitor Group OA-115/CRC

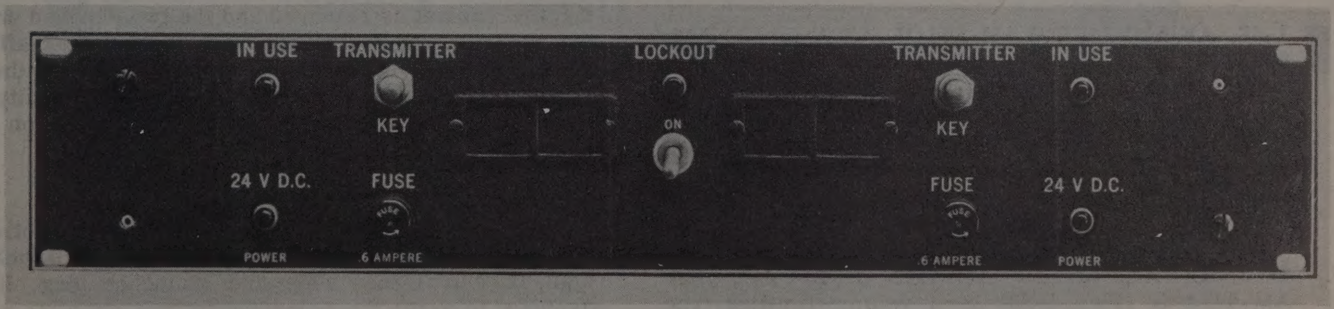

IN USE
TRANSMITTER
KEY
24 V D.C.
POWER
FUSE
6 AMPERE
LOCKOUT
ON
TRANSMITTER
KEY
IN USE
FUSE
6 AMPERE
24 V D.C.
POWER

Figure 1-29. Control Panel SB-270/FSA-4

(To be supplied at a later date.)

Figure 1-30. Power Supply PP-1453/FSA-4

Its operational power is derived from Power Supply PP-1453/FSA-4 (Fig. 1-30). Six of these control panels, with a power supply, are mounted in the electrical equipment cabinet described above.

1-41. INTERCONNECTING GROUP OA-447/FSA-4. Interconnecting Group OA-447/FSA-4 (Fig. 1-31) is a factory-wired assembly of components mounted on the front surface of a standard rack for testing and distribution of circuits that pass through the group. Facilities are provided for a wide variety of connections and patching combinations. This group includes Electrical Meter Assembly ID-352/FSA-4, a telephone test set, Telephone Jack Assembly TA-240/FSA-4, two Telephone Jack Assemblies TA-238/FSA-4, two Telephone Jack Assemblies TA-253/FSA-4, and Oscillator O-37/FRT. One of these interconnecting groups is installed at the transmitter site, one at the receiver site, and one at the air-traffic-control-tower site.

1-42. AF AMPLIFIER AM-864/U. AF Amplifier AM-864/U (Fig. 1-32) is a compressor-type amplifier with a constant audio output. It is used in this facility for limiting the audio output power from each remote receiver to the lines between the receiver building and air traffic control tower, thus minimizing the possibility of crosstalk.

1-43. AF AMPLIFIER AM-447A/G. AF Amplifier AM-447A/G (Fig. 1-33) is a volume-limiting-type audio amplifier. It is primarily used in this facility to amplify the low signal level from each remote-receiver line to a power sufficient to drive loudspeakers in the air-traffic-control-tower cab. In addition, the amplifier automatically limits the output to a predetermined volume.

1-44. SOUND RECORDER-REPRODUCER RD-142/UN. Sound Recorder-Reproducer RD-142/UN (Fig. 1-34) is designed to record continuously on magnetic tape for a maximum period of 24-1/4 hours. It is a dual track unit containing two amplifier channels. Recordings can be made from two audio sources simultaneously. Playback is possible on either channel or simultaneously on both channels. The recording on channel 2 is identified by a periodic low-level tone occurring every few seconds. Each audio channel may be individually monitored and checked or both channels may be monitored and checked simultaneously during the recording process. The recorder-reproducer in its cabinet is 17-3/16 inches high, 21 inches wide, and 12-1/2 inches deep. However, in this facility, the cabinet is removed and the two exposed units are mounted on a standard rack in the air-traffic-control-tower equipment room. Three of these recorder-reproducers are utilized in this facility to record two-way radiotelephone communication on six channels.

1-45. DEMAGNETIZER MX-1724/UN. Demagnetizer MX-1724/UN (Fig. 1-34) is a portable unit 9 inches high, 10-7/16 inches wide, and 13 inches long. It is designed to erase the recording from a complete reel of magnetic tape in a few seconds.

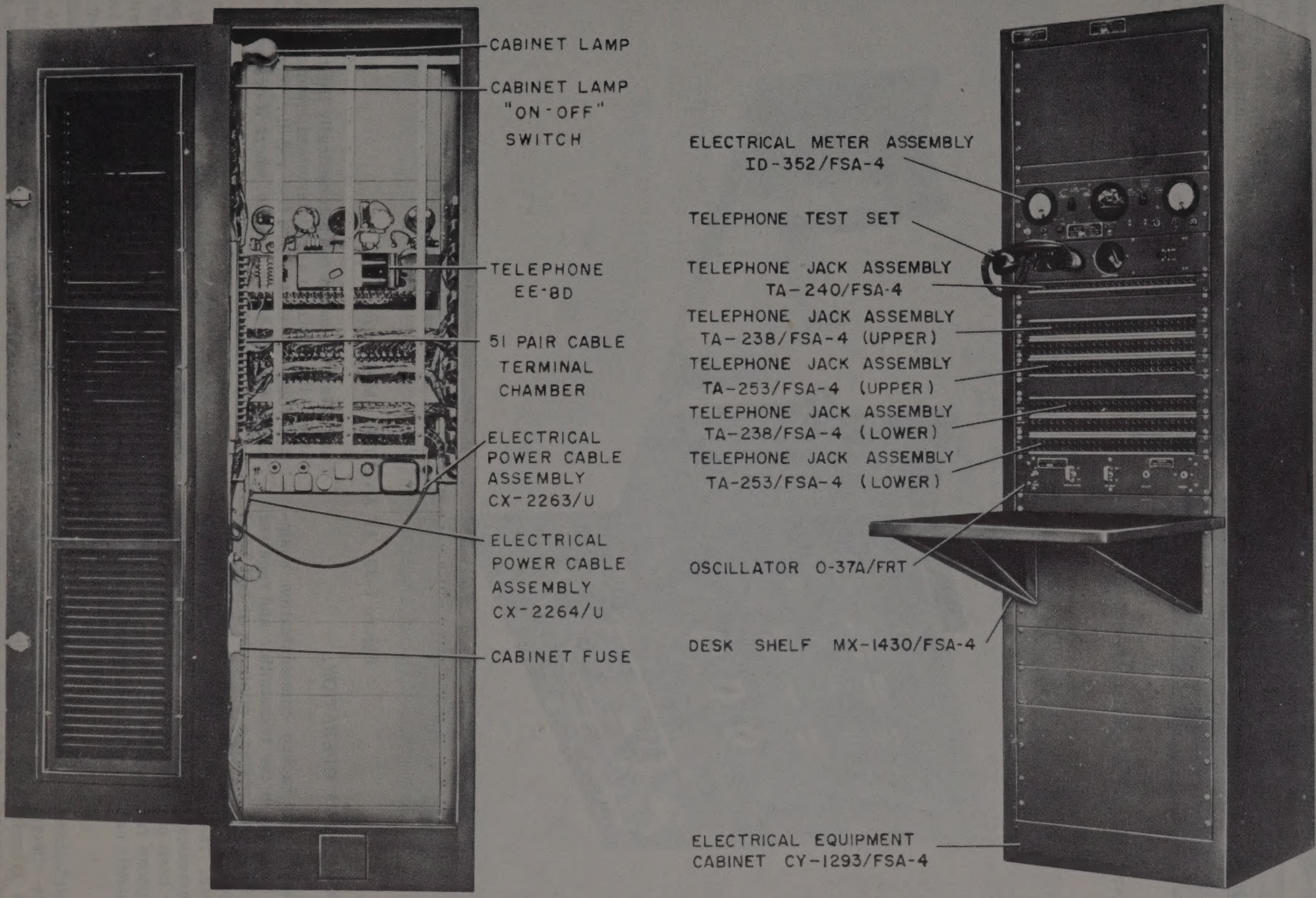

CABINET LAMP
CABINET LAMP "ON-OFF" SWITCH
TELEPHONE EE-8D
51 PAIR CABLE TERMINAL CHAMBER
ELECTRICAL POWER CABLE ASSEMBLY CX-2263/U
ELECTRICAL POWER CABLE ASSEMBLY CX-2264/U
CABINET FUSE
ELECTRICAL METER ASSEMBLY ID-352/FSA-4
TELEPHONE TEST SET
TELEPHONE JACK ASSEMBLY TA-240/FSA-4
TELEPHONE JACK ASSEMBLY TA-238/FSA-4 (UPPER)
TELEPHONE JACK ASSEMBLY TA-253/FSA-4 (UPPER)
TELEPHONE JACK ASSEMBLY TA-238/FSA-4 (LOWER)
TELEPHONE JACK ASSEMBLY TA-253/FSA-4 (LOWER)
OSCILLATOR O-37A/FRT
DESK SHELF MX-1430/FSA-4
ELECTRICAL EQUIPMENT CABINET CY-1293/FSA-4

Figure 1-31. Interconnecting Group OA-447/FSA-4

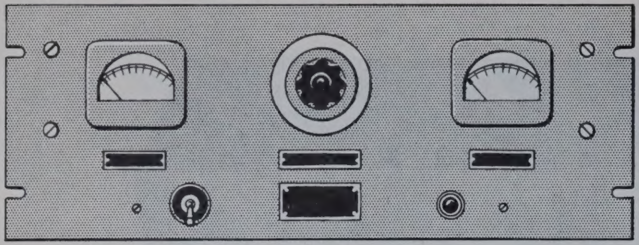


Figure 1-32. AF Amplifier AM-864/U

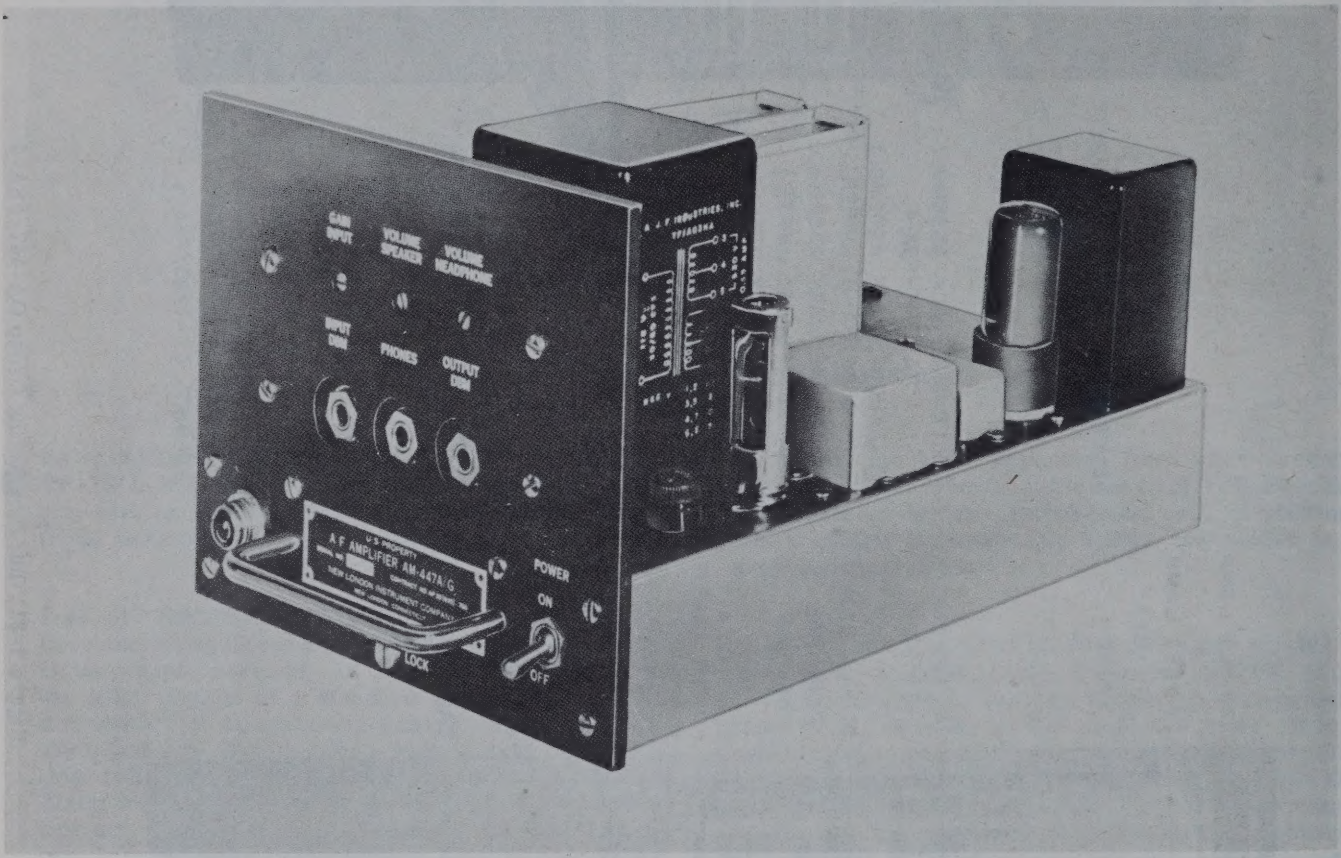


Figure 1-33. AF Amplifier AM-447A/G

1-46. PRINCIPLES OF OPERATION.

1-47. The active and backup communication equipments are installed in the transmitter and receiver buildings, which are located a minimum of 1,500 feet apart and considerably removed from the air traffic control tower. The tower houses the console and the standby communication equipment. After these equipments have been placed in a ready condition, control of radiotelephone transmission and reception on preselected channels can be maintained from the control-tower cab.

1-48. Radiotelephone communication at the control-tower cab is effected through a system of switches, relays, and transformers, utilizing telephone and control lines connecting the control tower with the transmitter and receiver buildings.

1-49. The receivers in the receiver building are preset to assigned r-f communication channels. Incoming signals on these channels pass from each receiver, through a centralized test and distribution point, to its respective line amplifier. This amplifier automatically limits the signal volume to a predetermined level and relays it through the centralized test and distribution point to the air-traffic-control-tower equipment room. Here the signal passes through another centralized test and distribution point and is recorded as it enters another line amplifier. This amplifier increases and automatically limits the volume of the signal to a predetermined power and relays it, through the centralized test and distribution point, to the control-tower console, where it drives its associated channel loudspeaker.

1-50. When a transmitter channel is selected by depressing a channel switch at console operating position A or B, relays actuate to switch control of the transmitter to the microphone push-to-talk switch. When the push-to-talk switch is depressed the loudspeakers are muted and a voltage is relayed from the console, through a centralized test and distribution point in the control-tower equipment room, to the transmitter building. In the transmitter building, voltage passes through another centralized test and distribution point to a control panel, where relays operate to switch the transmitter on or off the air.

1-51. When the push-to-talk switch is depressed, voice picked up by the microphone is amplified to a predetermined level by a line amplifier in the console. It is then relayed over the same lines that carry the transmitter control voltage, to the modulator, where it is again amplified to a power sufficient to modulate the carrier.

(To be supplied at a later date.)

Figure 1-34. Sound Recorder-Reproducer RD-142/UN and Demagnetizer MX-1724/UN

SECTION II
LOGISTICAL DATA

2-1. INTRODUCTION.

2-2. PURPOSE AND SCOPE. This section contains information for use by personnel responsible for shipping, handling, and housing the Control-Tower Facility Equipment.

2-2A. SFEL REQUIREMENTS. Standard Facility Equipment List Number FA-1-01, Basic Control-Tower Facility shows the equipment procured for this facility.

2-2B. DIRECTORY OF EQUIPMENT. This directory of equipment (Table 2-1) is a typical BILL OF MATERIAL, and is included for informational purposes only. Refer to the current issue of T.O. 31-1-11, Catalog of Standard Facility Equipment Lists for the latest SFEL to be used for engineering purposes.

TABLE 2-1.

TYPICAL BILL OF MATERIAL, CONTROL TOWER SYSTEM

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
MAJOR ITEMS				
1600-217242100	Receiver, BC-624-C	ea	1	Local Control Tower VHF Backup
1600-222006600	Transmitter BC-625-AM	ea	1	Local Control Tower VHF Backup
1700-015653915	Cabinet, Supplementary	ea	2	Backup control and DF indicator mounting
1700-016092180	Console AN/FRC-19B	ea	1	Control Tower Console
1700-017966050	Modulator MD-141A/GR	ea	4	Modulator - Power Supply for single channel UHF equipment
1700-017966060	Modulator MD-129A/GR	ea	1	Modulator - Power Supply for Multi-channel remote UHF backup
1700-018613477	Radio Set AN/GRC-32B	ea	1	Local Control Tower UHF backup
1700-018781210	Radio Receiver R-278B/GR	ea	1	Multi-channel UHF Remote backup receiver
1700-018781220	Radio Receiver R-361A/GR	ea	4	Single channel remote UHF equipment
1700-019366005	Transmitter, T-217A/GR	ea	1	Multi-channel remote UHF backup equipment
1700-019634000	Transmitter, T-282/GR	ea	4	Single channel remote UHF equipment
1700-202634000	Antenna Equipment RC-81C	ea	2	VHF Antenna for remote sites
1700-217247500	Receiver BC-639	ea	1	Remote VHF receiver
1700-222020350	Transmitter BC-640	ea	1	Remote VHF Transmitter

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
1700-370951000	Rectifier RA-42	ea	1	Used with BC-639 Receiver
1790-050140501	Amplifier AM-447A/G	ea	9	Speaker Amplifier in Control Tower Equipment Room
1790-051261112	Demagnetizer MX-1724/UN	ea	1	To clear recorder tape
1790-02261010	Signal Group OA-447/FSA-4	ea	3	Patch panel assy, 1 at each of 3 Control Tower System Sites
1790-053122002	Panel MX-1125/G	ea	6	Mounting for AM-447 Amplifiers, 1 each 447 and 3 for Amplifiers in Control Tower Equipment room
1790-053560124	Recorder, RD-142/UX	ea	3	For recording 6 channels, transmitter and receiver
1790-292634500	Loudspeaker Assy 2Z6380	ea	3	Test purposes, in OA 447
6025-1130-(1)	Altimeter Setting Indicator MS24134-(1)	ea	1	(Kollsman) Self explanatory
7CAC-318208-347	Frequency Meter BC-638A	ea	1	Spotting VHF singals and setting equipment
294732050	Cabinet 2Z7383-453A	ea	6	For Mounting Equipment at 3 Control Tower System Sites
611019815	Amplifier AM-864/U	ea	6	Output limiting line amplifiers for receiver to telephone line
	MINOR ITEMS (as designated FY 56)			
1600-211944737	Control, Radio, C-628/ARC-27	ea	1	Used to control UHF local backup equipment mounting in panel described in NAV-4010
1600-286760030	Case, CS-80	ea	1	For mounting BC-624/625
1600-294712000	Rack FT-244	ea	1	Mounting for local VHF back-up equipment
1700-015662802	Cable Assy CX-2017/U	ea	4	Power and Control Cable except HV between transmitter and modifier
1700-016091900	Conduit MX-1174/U	ea	10	For mounting on rack MT-686 to carry cables horizontally
1700-018520546	Power Supply, Metallic, PP-1453/FSA-4	ea	1	To supply power for SB-270/FSA-40
1700-201020803	Antenna AT-197/GR	ea	10	UHF Discone antennas
1700-202470560	Antenna AN-188	ea	1	Local backup VHF equipment antenna

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
1700-211781580	Control, Radio BC-1312	ea	1	Remote control unit mounted on local VHF backup equipment
1700-211781620	Control, Radio BC-1314	ea	1	Remote control unit mounted in cab for control of local VHF backup equipment
1700-211945116	Control Indicator C-806/GR	ea	1	Used with multichannel UHF equipment for channel selection
1700-293185500	Mounting FT-314A	ea	1	Used to mount CS-80 with BC-624/625 to MT-686 rack
1700-294732588	Rack MT-686/GR	ea	6	3 each used at transmitter and receiver site for mounting VHF equipment
1700-295560744	Shelf, Desk MX-1058/U	ea	5	Mounted on 686 racks for convenient shelf
1700-321859500	Cable Assy Power CD-809	ea	1	Power Cable Assy between BC-624/625 and Rectifier RA-62
1700-321914280	Cord CD-881	ea	1	Power cord used to connect BC-639 to the RA-42 Rectifier
1700-321914560	Cable Assy CD-883	ea	1	AC Power cord between RA-42 and AC outlet
1700-322847500	Cable Assy, CX-1539/U	ea	1	Control Cable between J-390/AR and control strip J1404 on MD-129/GR
1700-322847550	Cable Assy CX-1540/U	ea	1	R-278 Control Cable to J-390/GR
1700-322847600	Cable Assy CX-1541/U	ea	10	UHF equipments AC line to J-390/GR
1700-322874650	Cable Assy CX-1564/U	ea	1	Control cable used between T-217A/GR and MD-129A/GR
1700-322971538	Cable Assy CD-1333	ea	1	Antenna cable between BC-624/625 and AN-188
1700-322981797	Cable Assy CG-693/U	ea	9	2 used between T-282 and MD-141, 1 used between T-217 and MD-129
1700-322981799	Cable Assy CG-707/U	ea	10	Short RF cable used to connect UHF equipment to main antenna cable
1700-349213697	Panel, J-390/GR	ea	5	Distribution panel for use with UHF equipment
1700-371072000	Rectifier RA-62	ea	1	Power Supply for BC-624/625

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
1760-322758000	Cable Assy, Power	ea	6	AC line for AM-864/U Amplifier
1790-053122000	Panel, Control, SB-270/FSA-4	ea	6	Transmitter Control Panel, mounted at remote site
1790-207600000	Headset, HS-33	ea	4	For test purposes
1790-207905000	Microphone, T-17	ea	1	For operation of BC-624/625
1790-441848500	Box, Terminal	ea	2	Used with AF termination block for housing
1790-511100000	Chamber, 5C560-51H	ea	3	Binding post chamber for mounting in telephone cabinets at the control tower equipment room and both remote sites
1790-611730400	Loudspeaker 51/4" max.	ea	3	For mounting in supplementary cabinet for local backup equipment
3300-111980000	Wire #18 AWG	ft	25	For wiring control panel for local standby equipment
3325-135833	Bolt, Machine	ea	48	Installation Hardware
3325-866851	Step, PE-37	ea	200	Installation Hardware (Antenna Poles)
3325-956017	Washer, saddle 5/8"	ea	16	Installation Hardware (Cross arm, antenna)
3330-318001191	Capacitor, fixed, paper, 25 MFD	ea	1	Part of local backup control system
3340-296866000	Transformer, Power	ea	1	6.3V light gun power
3350-113000-2419	Resistor fixed 270 ohms	ea	32	Part of loss pad for AM-864 input
3350-121000-1699	Resistor fixed 65 ohms	ea	8	Part of loss pad for AM-864 input
3350-169000-2915	Resistor fixed 600 ohms 2W	ea	1	Part of local backup control circuits
3350-858000-2571	Resistor Variable 200 ohms 4W	ea	1	Part of local backup control circuits
3360-074030510	Switch, toggle, SPST	ea	5	Spot and traffic control light switcher
3360-395314102	Switch, Push, SPST Normally Closed	ea	1	6 Volt ATC light test switch
3380-512370-7115	Relay (2Z7580-94)	ea	1	Used as part of 6V ATC light circuit
3380-701080-1325	Relay (BD-30)	ea	1	Part of local standby control panel

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity	Use or Purpose
3380-5017605575	Relay DPDT (Use only if BC-1314 NA)	ea 1	Part of local standby control panel
6500-326620	Clip, loop, 9/16"	ea 50	Installation Hardware
6500-326665	Clip, loop, 7/8"	ea 200	Installation Hardware
6600-324380-3	Grommet, rubber	ea 3	Used on construction of automatic ATC light changeover unit
6600-324381	Grommet, rubber 7/16"	ea 1	Part of local backup equipment control unit
6700-001450	Anchor, wood screw, 3/4"	ea 20	Installation Hardware
6700-035350	Bolt, carriage (3/8" by 1")	ea 48	Installation Hardware
6700-043360	Bolt, expansion	ea 4	Installation Hardware
6700-054110	Bolt, hex head	ea 96	Installation Hardware
6700-054850	Bolt, hex head	ea 288	Installation Hardware
6700-191187	Clamp, cable, 3 hole	ea 8	Installation Hardware
6700-195200	Clip, wire rope 3/8"	ea 2	Installation Hardware
6700-352600	Nut, machine screw	ea 108	Installation Hardware
6700-322750	Nut, machine screw (8-32)	ea 36	Installation Hardware
6700-352900	Nut, machine screw (10-32)	ea 36	Installation Hardware
6700-353499-5	Nut, hex, 1/4 - 20	ea 156	Installation Hardware
6700-356000	Nut, hex, 1/4"	ea 16	Installation Hardware
6700-366150	Nut, hex, 5/16" - 18	ea 432	Installation Hardware
6700-356300	Nut, hex, 3/8"	ea 288	Installation Hardware
6700-359450	Nut, hex 3/8"	ea 224	Installation Hardware
6700-625600	Screw, Cap, hex head 1/4"	ea 16	Installation Hardware
6700-625720	Screw, Cap, hex head 1/4"	ea 156	Installation Hardware
6700-636382-926	Screw, FH, steel	ea 20	Installation Hardware
6700-640050	Screw, lag, steel	ea 16	Installation Hardware
6700-650280-125	Screw, machine	ea 12	Installation Hardware
6700-672850	Screw, machine	ea 12	Installation Hardware
6700-725075-336	Screw, RH	ea 72	Installation Hardware
6700-725075-34	Screw RH	ea 24	Installation Hardware
6700-725075-418	Screw, Machine	ea 24	Installation Hardware

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
6700-749542-4	Screw, Sheet Metal	ea	36	Installation Hardware
6700-761150	Screw, steel	ea	12	Installation Hardware
6700-815400	Screw, wood (brass)	ea	144	Installation Hardware
6700-852100	Screw, wood	ea	24	Installation Hardware
6700-853688-5	Screw, wood	ea	24	Installation Hardware
6700-853689-9	Screw, wood	ea	24	Installation Hardware
6700-888280	Strap, pipe, (1 hole)	ea	5	Installation Hardware
6700-988522-56214	Washer, steel	ea	112	Installation Hardware
6700-989720	Washer, lock	ea	12	Installation Hardware
6700-990413	Washer, lock (1/4")	ea	156	Installation Hardware
6700-990550	Washer, lock	ea	336	Installation Hardware
6700-990860	Washer, lock (1/2")	ea	20	Installation Hardware
6700-991380-139	Washer, lock, bronze	ea	240	Installation Hardware
6700-991380-14	Washer, lock, bronze	ea	24	Installation Hardware
6700-991380-143	Washer, lock, bronze	ea	24	Installation Hardware
6700-996000	Washer, plain	ea	48	Installation Hardware
6750-822000	Tape, Gummed, 2" wide	rl	2	Installation Hardware
6800-142030	Sheet Aluminum Alloy .064" thick	SF	2	Used for construction of ATC light changeover panel
6800-144900	Sheet Aluminum Alloy, .081" thick	SF	5	Mounting bracket stock for control tower Console
6800-388000	Solder, rosin core, SN 50	lb	6	Construction hardware
6800-489750	Steel Sheet, .0438"	SF	7	Panel and bracket stock
7300-223100	Compound, Insulating, 8 oz	TU	6	For waterproofing coaxial cable
7700-547690	Light, indicator anchor	ea	1	Indicator for 6 VAC to 6 VDC ATC light changeover panel
8100-631760	Reel, Appleton RE-B21-010	ea	2	To hang ATC lights in control tower cab
8500-505175	Flux, soldering	oz	2	For soldering power connections
8800-038200	Box, connector, 1/2"	ea	7	Installation Hardware
8800-146434	Clamp, Electrical, 2"	ea	4	Installation Hardware

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
8800-174200	Conduit, flexible, 1/2"	ft	5	Installation Hardware (for routing power cable)
8800-265332	Cover, blank, electrical	ea	1	Installation Hardware
8800-429029	Tape, Insulating	rl	5	For wiring
8800-438035-5	Junction Box	ea	1	Installation Hardware
8800-438035-6	Junction Box	ea	1	Utility cabinet for mounted changeover control tower light unit
8800-438250	Junction Box	ea	2	Installation Hardware
8800-438279	Junction Box	ea	1	Installation Hardware
8800-578000	Nut, lock, conduit	ea	20	Installation Hardware
8800-729175	Ground rod (GP-6)	ea	12	Grounding circuits
8800-789000	Staple insulated (Nr 6)	ea	600	For securing wires to wooden parts of control tower and antenna poles
8800-873600-0	Scotch tape (Nr 0)	rl	2	Numbered tape for identifying circuits
8800-873600-1	Scotch tape (Nr 1)	rl	2	Numbered tape for identifying circuits
8800-873000-2	Scotch tape (Nr 2)	rl	2	Numbered tape for identifying circuits
8800-873000-3	Scotch tape (Nr 3)	rl	2	Numbered tape for identifying circuits
8800-873000-4	Scotch tape (Nr 4)	rl	2	Numbered tape for identifying circuits
8800-873000-5	Scotch tape (Nr 5)	rl	2	Numbered tape for identifying circuits
8800-873000-6	Scotch tape (Nr 6)	rl	2	Numbered tape for identifying circuits
8800-873000-7	Scotch tape (Nr 7)	rl	2	Numbered tape for identifying circuits
8800-873000-8	Scotch tape (Nr 8)	rl	2	Numbered tape for identifying circuits
8800-873000-9	Scotch tape (Nr 9)	rl	2	Numbered tape for identifying circuits
8850-100925	Adapter, cable	ea	2	Installation Hardware
8850-152057	Plug PL-306	ea	2	Coaxial connector to RC-81
8850-152058	Plug PL-307	ea	1	Used with RC-81-C Antenna

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
8850-210960	Connector Plug	ea	2	Installation Hardware
8850-215620	Connector Plug	ea	16	Installation Hardware
8850-215780	Connector Plug	ea	1	Installation Hardware
8850-366166	Connector	ea	1	Installation Hardware
8850-368656-54	Connector	ea	1	Installation Hardware
8850-463910	Connector Plug (PL-310)	ea	1	RG-34/U Coaxial connector to BC-639
8850-468668	Connector Plug UG-94U	ea	1	RF plug for VHF antenna cable
8850-470035	Connector Plug UG-495/U	ea	20	RF plug for UHF antenna cable
8850-503090	Connector Receptacle	ea	1	Installation Hardware
8850-530300	Connector Receptacle	ea	4	Installation Hardware
8850-654960	Connector Receptacle	ea	6	Installation Hardware
8850-660150	Connector Plug (PL-169)	ea	2	Connector for multi-pair cable between BC-1312 and BC-1314
8850-749390	Jack, telephone, 3 contact	ea	1	P/O local backup control panel
8860-050000-825	Braid, copper	ft	100	Used as flexible ground conductor
8860-196000-355	Cable power WC-643	ft	1225	Used as installation power wiring
8860-218225-925	Koiled Kord, Graybar 8022	ea	2	Used as power line for ATC lamps (cut one in half, other spare)
8860-237500-255	Cable, Power, 14 AWG	ft	100	Installation power wiring
8860-309650-211	Cable, Coaxial, RG-17A/U	ft	1250	Low loss UHF antenna feeder
8860-312800-211	Cable, Coaxial, RG-8/U	ft	150	Local backup VHF installation
8860-328100-211	Cable, Coaxial, RG-34/U	ft	300	P/O 639/640 installation (antenna)
8860-385000-211	Cable, Special Purpose (2 #18 AWG cond)	ft	500	Audio cables for installation wiring
8860-450000-325	Cable, Special Purpose	ft	6000	Single wire shielded for installation wiring
8860-644000-855	Wire, Black, insulated, 14 AWG	ft	400	Hookup wire
8860-693950-211	Wire, Stranded (w-115)	ft	200	Hookup wire

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
8870-716000-498	Lamp, incandescent	ea	5	Control tower cab fixture light bulbs
8870-938000-375	Lamp, incandescent	ea	1	ATC changeover indicator lamp
8880-307000-5755	Splice conductor (#6 wire)	ea	25	P/O installation grounding system
8880-500621-3155	Terminal board	ea	1	Equipment wiring
8880-500621-7255	Terminal board	ea	2	Equipment wiring
8880-501021-1955	Terminal Strip 10 terminal	ea	2	Harness terminals
8880-501221-5155	Terminal board	ea	4	Harness terminals
8880-741000-2395	Terminal lug	ea	12	Installation Hardware
8880-748000-3225	Terminal lug	ea	25	Installation Hardware
8880-755000-3955	Terminal lug	ea	500	Installation Hardware
8880-792000-4555	Terminal lug	ea	50	Installation Hardware
8880-850000-2155	Terminal stud	ea	50	Installation Hardware
17-7985102-211	Receptacle (6Z7809)	ea	2	Installation Hardware
18-0625 500-500	Tally-pace	ea	4	Operational equipment
42-8680 150-090	Staple 1 1/2" Nr 9	lb	2	For tacking cable to antenna poles
3375247-6921	Solder, lead tin bar SN40	lb	2	Heavy soldering
4020 231-5886	Twine, lacing, type N	lb	5	For lacing and securing wire
5970 189-5912	Sleeve, Cotton FS-97	box	2	For splicing cable
6145 146-0162	Braid, 11/16"	ft	200	For shielding audio circuits
6210 299-5825	Light, Traffic, B-3	ea	2	Control Tower traffic signal light
9160 242-5340	Wax, paraffin	lb	2	Cable splicing material
106380000	Wire, messenger, 7 Strand (1A115)	ft	200	Messenger cable
107100140	Wire, Electric, #6 (1A806.9)	ft	300	Grounding system
107550000	Wire, Electric, #18 (1A818)	ft	250	Hookup wire
111166000	Wire, Electric, (1B117)	ft	1000	Hookup wire
112417310	Cable (1B3018-10.1)	ft	50	5 pair control cable
203600200	Guy Kit (2A1622)	ea	12	Antenna pole guys
293472000	Panel (2Z6957)	ea	2	Blank Utility panels

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity	Use or Purpose
	Panel (3H4109-9) 7" high	ea 1	Blank 7" utility panel
293485644	Panel (2Z6961. 24)	ea 4	Blank utility panels
301380000	Battery, dry (3A44)	ea 2	Emergency ATC light power
320017280	Cord Assy (3E3P70)	ea 40	Patch cords, OA447
320017280	Cord Assy (3E3P15A)	ea 40	Patch cords, OA447
	Insulator, washer, flat, 3G1838-12. 21	ea 4	For mounting telephone jack on local backup control
396317000	Terminal Kit (3Z12026)	ea 1	
	Switch, lever (4C5104. 79Y2)	ea 5	
440224000	Connector block, (4E331C)	ea 1	
441584120	Terminal, cable (4E7719BC)	ea 4	
501200100	Cross arm (5A1525. 1)	ea 16	Mounting antenna
501820000	Pole (5A3290-1)	ea 4	Mounting antenna
501930000	Step, pole, wood (5A3710)	ea 12	For poles at bottom
506275100	Bolt, (5B1108-47)	ea 32	Antenna pole installation
506755000	Brace, PF-7 (5B2107)	ea 32	Antenna pole installation
507440000	Hook, guy (5B5283. 5)	ea 8	Antenna pole installation
507463070	Kit, Guy, (5B5701)	ea 12	Antenna pole guys
507550000	Nut (5B6510)	ea 48	Antenna pole installation
507635000	Plate (5B8504-8)	ea 4	Antenna pole installation
507770000	Ring, PF-69 (5B9456)	ea 200	Antenna pole installation
507875000	Screw, lag (5B10006-45)	ea 16	Installation Hardware
508300100	Thimble (5B18045)	ea 4	ATC light mounting
508309815	Turnbuckle (5B19005-8. 31)	ea 8	To adjust pole guys
508395000	Washer 5/8" (5B20209-11)	ea 48	Installation Hardware
	Insulator, Washer, (CL50656-2B)	ea 4	To insulate telephone jack on local standby panel
663010000	Bandage (6N597)	ea 3	
	Sleeve (6N5576)	ea 3	
698240200	Wraplock, 1/2" (6Z8565)	cn 2	Secure or bundle wire
	Plug, Cap, Lock (6Z17344)	ea 2	

TABLE 2-1—Continued

Stock Number	Nomenclature	Unit & Quantity		Use or Purpose
8800-NSL4045	Base and Bail, Hubbard 3945	ea	2	For hanging ATC lights - light/cable
8800-NSL4576	Rod, hanger	ea	56	Cable hanger in remote sites
8800-NSL4253	Flange, ceiling	ea	56	Cable hanger in remote sites
8800-NSL4255	Fixture, console lighting	ea	5	Control tower cab lighting fixtures
8800-NSL4258	Hanger, Conduit 3 1/2"	ea	56	Cable hanger in remote sites
8800-NSL4562	Wheel, Appleton, RE-A1-B21	ea	1	For adjusting spring tension on ATC reels
NSL	Clevis (556)	ea	2	For mounting B-3 ATC lamps
NSL	Switch 15A, 125VAC/DC, Type ML Form 4 - Circuit Breaker	ea	4	Power switch for local backup

b. Control-Tower Equipment Room—60 lb per sq ft

c. Receiver Building—60 lb per sq ft

d. Transmitter Building—75 lb per sq ft

2-12. ANTENNA SUPPORTS. Four poles are supplied to support the uhf and vhf antennas at the remote receiver and transmitter sites. For installation details and requirements, see Section III.

2-13. CABLE REQUIREMENTS. Adequate telephone cables are required between the control tower and remote transmitter and receiver buildings. The specific requirements are set forth in Section III.

2-14. QUARTZ CRYSTALS. Quartz crystals must be ordered according to the desired operating frequencies for the following items of equipment:

a. Radio Transmitter T-282/GR—This is a single-channel transmitter and requires one quartz crystal. Use the following formula to determine the required crystal frequency for a given operating frequency:

$$\text{Crystal frequency (kc)} = \frac{\text{Operating freq. (mc)} \times 1000}{36}$$

b. Radio Transmitter BC-640-D—This is a single-channel transmitter and requires one quartz crystal. Use the following formula to determine the required crystal frequency for a given operating frequency:

$$\text{Crystal frequency (kc)} = \frac{\text{Operating freq. (mc)} \times 1000}{18}$$

c. Radio Transmitter BC-625-AM—This is a four-channel transmitter and requires four quartz crystals. Use the following formula to determine the required crystal frequencies for given operating frequencies:

$$\text{Crystal frequency (kc)} = \frac{\text{Operating freq. (mc)} \times 1000}{18}$$

d. Radio Receiver BC-624-C—This is a four-channel receiver and requires four quartz crystals. Use the following formula to determine the required crystal frequencies for given operating frequencies:

$$\text{Crystal freq. (kc)} = \frac{\text{Operating freq. (mc)} -12}{H} \times 1000$$

Where H is the crystal harmonic used (see Table 2-5 below)

TABLE 2-5
RADIO RECEIVER BC-624-C, CRYSTAL HARMONICS

Operating Frequency (MC)	Harmonic (H)
100-108	11
108-116	12
116-124	13
124-132	14
132-140	15
140-148	16
148-156	17
156	18

e. Radio Receiver R-361/GR—This is a single-channel receiver and requires one quartz crystal. Use the following formula to determine the required crystal frequency for a given operating frequency:

$$\text{Crystal freq. (kc)} = \frac{\text{Operating freq. (mc)} -40.4}{9} \times 1000$$

f. Frequency Meter BC-638-A—This frequency meter requires six quartz crystals, including one spare. Use the following formula to determine the required crystal frequencies for given operating frequencies:

$$\text{Crystal frequency (kc)} = \frac{\text{Operating freq. (mc)} \times 1000}{18}$$

2-15. KOLLSMAN ALTIMETER.

2-16. Kollsman Altimeter Setting Indicators are manufactured to cover various installation-altitude ranges. The proper type must be specified during requisitioning and/or C-E scheme preparation. These units are specifically typed for installation at altitudes as follows:

Model 1130-013	-100 to 3300 ft
Model 1130-014	3200 to 6600 ft
Model 1130-015	6500 to 10,000 ft

2-17. REFERENCE DOCUMENTS.

2-18. The following Technical Orders, Air Force Regulations, USAF drawings, and AACS NAV-series drawings are applicable to the Control-Tower Facility. Requests for copies of the first three should be made in accordance with T.O. No. 00-5-2. Requests for AACS NAV-series drawings should be made to the AACS Installation and Maintenance Squadron in the theater command.

a. T.O. No. 12R2-2ARC27-1, Operation Instructions—Radio Set AN/ARC-27

b. T.O. No. 12R2-2ARC27-2, Maintenance Instructions—Radio Set AN/ARC-27

c. T.O. No. 12R2-2ARC27-4, Illustrated Parts Breakdown—Radio Set AN/ARC-27, 27A

d. T.O. No. 12R2-3SCR522-1, Operating Instructions—Radio Sets SCR-522-A, SCR-542-A

e. T.O. No. 12R2-3SCR522-2, Maintenance Instructions—Radio Sets SCR-522-A, SCR-542-A

f. thru k. (Deleted)

l. T.O. No. 31R2-2GRC27-1, Operation and Service Instructions—Radio Set AN/GRC-27

m. T.O. No. 31R2-2GRC27-4, Parts Catalog—Radio Set AN/GRC-27

n. T.O. No. 31R2-2GRC27-12, Maintenance Instructions—Radio Receiver Group OA-192/GR including Radio Receivers R-278/GR, R-278A/GR, R-278B/GR

o. T.O. No. 31R2-2GRC29-2, Maintenance Instructions—Transmitter Group OA-104/GR (Transmitter T-217/GR and T-217A/GR) and Modulator-Power Supply Group OA-191/GR (Modulator-Power Supply MD-129/GR and MD-129A/GR)

p. T.O. No. 31R2-2GRC29-24, Illustrated Parts Breakdown—Transmitter Group, OA-104/GR, Modulator-Power Supply Group, OA-191/GR

q. T.O. No. 31R2-2GRC32-1, Operating Instructions—Radio Sets AN/GRC-32, AN/GRC-32A, and AN/GRC-32B

r. T.O. No. 31R2-2GRC32-2, Service Instructions—Radio Sets AN/GRC-32, 32A, 32B

s. T.O. No. 31R2-2GRC32-3, Overhaul Instructions—Radio Sets AN/GRC-32, 32A, 32B

t. T.O. No. 31R2-2GRC32-4, Illustrated Parts Breakdown—Radio Sets AN/GRC32, 32A, 32B

u. T.O. No. 31R2-2GRR7-1, Operating Instructions—Radio Set AN/GRR-7

v. T.O. No. 31R2-2GRR7-2, Service Instructions—Radio Set AN/GRR-7

w. T.O. No. 31R2-2GRR7-3, Overhaul Instructions—Radio Receiver R-361/GR

x. T.O. No. 31R2-2GRR7-4, Parts Catalog—Radio Receiver R-361/GR

y. T.O. No. 31R2-2GRT3-1, Operating Instructions—Radio Transmitter Set AN/GRT-3

z. T.O. No. 31R2-2GRT3-2, Service Instructions—Radio Transmitting Set AN/GRT-3

aa. T.O. No. 31R2-2GRT3-13, Overhaul Instructions—Radio Transmitter T-282/GR, Modulator-Power Supply MD-141/GR, 141A/GR

ab. T.O. No. 31R2-2GRT3-14, Parts Catalog—Radio Transmitter T-282/GR, Modulator-Power Supply MD-141/GR, 141A/GR

ac. T.O. No. 31R2-3RC256-44, Parts Catalog—Antenna Equipment RC-81-C

ad. T.O. No. 31R2-3RC257-4, Parts Catalog—Radio Transmitter BC-640-D

ae. T.O. No. 31R2-3RC257-12, Maintenance Instructions—Radio Transmitter BC-640-D

af. T.O. No. 31R2-3SCR573-22, Maintenance Instructions—Antenna Equipment RC-81-A and Associated Coaxial Cable Equipment

ag. T.O. No. 31R2-3SCR573-32, Maintenance Instructions—Antenna Equipment RC-81-C

ah. T.O. No. 31R2-3SCR573-42, Maintenance Instructions—Radio Transmitters BC-640-A and BC-640-B

ai. T.O. No. 31R2-3SCR574-42, Maintenance Instructions—Radio Receiver BC-639-A

aj. T.O. No. 31R2-3SCR574-54, Spare Parts List—Rectifier RA-42-A

ak. T.O. No. 31R2-3SCR574-92, Maintenance Instructions—RA-42-A, B Rectifiers

al. T.O. No. 31R2-3SCR624-2, Maintenance Instructions—Radio Set SCR-624-A, B

am. T.O. No. 31R2-3SCR624-14, Spare Parts List—Radio Set SCR-624-A, B

an. T.O. No. 31R2-3SCR624-22, Maintenance Instructions—Rectifiers RA-62-A, B, C

ao. T.O. No. 31R3-2CRC-201, Operation Instructions—Air Force Amplifier AM-447A/G and Mounting Panel MX-1125/G

ap. T.O. No. 31R3-2CRC-202, Service Instructions—Air Force Amplifier AM-447A/G and Mounting Panel MX-1125/G

aq. T.O. No. 31R3-2CRC-204, Illustrated Parts Breakdown—Air Force Amplifier AM-447A/G and Mounting Panel MX-1125/G

ar. T.O. No. 31R3-2FRC19-1, Operating Instructions—Airport Control Tower Console AN/FRC-19A

as. T.O. No. 31R3-2FRC19-2, Service Instructions—Airport Control Tower Console AN/FRC-19A

at. T.O. No. 31R3-2FRC19-4, Parts Catalog—Airport Control Tower Console AN/FRC-19A

au. T.O. No. 31R3-2GR-111, Operation and Maintenance Instructions—Control Indicator C-806/GR

av. T.O. No. 31R3-2GR-114, Parts Catalog—Type C-806/GR Radio Control Indicator

aw. T.O. No. 31S1-2FSA4-1, Operating Instructions—Control-Monitor Group AN/FSA-4

ax. T.O. No. 31S1-2FSA4-2, Service Instructions—Control-Monitor Group AN/FSA-4

ay. T.O. No. 31S1-2FSA4-4, Illustrated Parts Breakdown—Control-Monitor Group AN/FSA-4

az. T.O. No. 33A1-3-30-1, Instruction Book for Operation and Maintenance of Test Equipment IE-19-A

ba. T.O. No. 33A1-5-8-2, Maintenance Instructions—Frequency Meter BC-638-A

bb. T.O. No. 33A1-8-80-1, Audio Oscillator TS-382A/U

bc. T.O. No. 33A1-8-80-11, Operation and Service Instructions—Audio Oscillator Models TS-382A/U and TS-382C/U

bd. T.O. No. 33A1-8-93-1, Signal Generator TS-497B/URR

be. T.O. No. 33A1-12-49-1, Operation and Service Instructions—Multimeter TS-352/U bf. T.O. No. 31-1-8, Implementation of Fixed Communications-Electronics Program

bg. T.O. No. 31-1-14, Siting Procedure for UHF Ground-to-Air Communications Equipment

bh. AFR 66-5, Maintenance-Installation-Engineering and Installation of Communications-Electronic Facilities

bi. AFR 86-1 (as amended), Installation Planning and Development Lateral Air Field Clearance Criteria

bj. AFR 86-3 (as amended), Installation Planning and Development, Airfield Zoning—Preventing Encroachments in Approaches and Airspace Surrounding Air Force Airfields

bk. AFR 91-14 (as amended), Utilities Operation and Services—National Standard on Obstruction Lighting

bl. AFR 91-19 (as amended), Utilities Operation and Services—National Standard on Obstruction Marking

bm. Drawing NAV-3008, VHF/UHF Transmitter and Receiver Building Types A and B, Coaxial Cable Hanger Installation Details

bn. Drawing NAV-4000, Air Traffic Control Tower Elevation Plan, Plan and Road Layout

bo. Drawing NAV-4005A, Air Traffic Control Tower Supplementary Cabinet

bp. Drawing NAV-4009, Air Traffic Control Tower Type B-3 Lamp Mounting Details

bq. Drawing NAV-4010, Control Panel for Local Standby Equipment

br. Drawing NAV-4014, Air Traffic Control Tower Cab Lighting Fixtures

bs. Drawing NAV-4016, Air Traffic Control Tower Emergency Air Traffic Control Lamp Power Transfer System

bt. Drawing AW-26-03-26, Emergency Power Building, Types 1, 2, and 3

bu. Drawing AW-38-12-18, Transmitter/Receiver Building Type A

bv. Drawing AW-38-12-19, Transmitter/Receiver Building Type B

bw. Drawing AW-78-18-01, Fuel Facilities for Navigational Aids

bx. Drawing AW-86-06-05, Control Tower, Incased

by. Drawing AW-86-06-06, Control Tower, Open Leg Trestle Type

bz. T.O. No. 31R3-2FRD19-14, Spare Parts List — Airport Control Tower Console AN/FRC-19B.

ca. T.O. No. 31R3-2FRC19-21, Operating Instructions — Airport Control Tower Console AN/FRC-19B (Radio Receptor).

cb. T.O. No. 31R3-2FRC19-22, Service Instructions — Airport Control Tower Console AN/FRC-19B (Radio Receptor).

cc. T.O. No. 31R3-2FRC19-25, Installation Instructions — Modification Kit MK-127/FRC (Radio Receptor).

cd. T.O. No. 31S1-2FSA4-11, Operating Instructions — Control-Monitor Group AN/FSA-4A (Federal Television).

ce. T.O. No. 31S1-2FSA4-14, Illustrated Parts Breakdown— Control-Monitor Group AN/FSA-4A (Federal Television).

cf. T.O. No. 31S1-2FSA4-15, Installation Instructions — Control-Monitor Group AN/FSA-4A (Federal Television).

cg. T.O. No. 31R3-2CRC-191, Operating Instructions — Air Force Amplifier AN-447/G, Mounting Panel MX-1125/G (Wicks).

ch. T.O. No. 31R3-2CRC-192, Service Instructions— Air Force Amplifier AM-447/G, Mounting Panel MX-1125/G (Wicks).

ci. T.O. No. 31R3-2CRC-194, Parts Breakdown — Air Force Amplifier AM-447/G, Mounting Panel MX-1125/G (Wicks).

cj. T.O. No. 31R2-3SCR574-64, Spare Parts List— Frequency Meter BC-638-A.

ck. T.O. No. 31R2-3BC639-14, Spare Parts List— Radio Receiver BC-639-AM.

cl. T.O. No. 31R2-3BC639-36, Preventive Maintenance Instructions — Radio Receiver BC-639-( ).

cm. T.O. No. 31S1-2FSA4-32, Service Instructions— Interconnecting Group OA-447/FSA-4 (AVCO).

cn. T.O. No. 31S1-2FSA4-34, Illustrated Parts Breakdown — Interconnecting Group OA-447/FSA-4 (AVCO).

co. T.O. No. 31R2-2GRC27-42, Maintenance Instructions —Transmitting Group OA-104/GR, Transmitter T-217/GR and T-217A/GR, and Modulator-Power Supply Group OA-191/GR, Modulator-Power Supply MD-129/GR or MD-129A/GR (Collins).

cp. T.O. No. 12R2-3SCR522-14, Spare Parts List— Radio Sets SCR-522-A, SCR-522-T2, SCR-542-A, and SCR-542-T2.

cq. T.O. No. 31R2-2GRC32-24, Spare Parts List— Radio Set AN/GRC-32 ( ).

cr. T.O. No. 31R2-2GRC32-502, Modification of Cabling to Radio Set AN/GRC-32 ( ).

cs. T.O. No. 31W1-2U-311, Audio-Frequency Amplifier AM-864/U (TM 11-5081).

ct. Drawing NAV-3012A, Remote-Transmitter-Control Circuits SB-270/FSA-4. Latest revision 27 October 1955.

cu. Drawing NAV-3004B, UHF/VHF Antenna Mounting Details.

SECTION III
INSTALLATION ENGINEERING

3-1. INTRODUCTION.

3-2. PURPOSE OF SECTION. This section is for use by the installation-engineering personnel whose responsibility it is to select a site, prepare a plot plan, engineer a Bill of Material (B/M), and do the other installation engineering necessary to adapt the facility to the particular physical location, available utilities, and other supporting facilities.

3-3. Included in this section are preinstallation construction requirements for the transmitter and receiver sites. For purposes of this handbook, it is assumed that a standard control tower, constructed and situated in accordance with USAF drawing AW-86-06-05 or 86-06-06 and AACS Dwg. No. NAV-4000, is already available. Therefore, the only control-tower construction discussed in this section is that required for adapting a standard tower to the needs of this facility.

3-4. C-E SCHEME. The C-E scheme, which should be prepared in accordance with the requirements of AFR 66-5 and T.O. No. 31-1-8, includes general information, engineered Bill of Material (B/M), and supporting technical data. (Sect. IV of this handbook, as modified by the C-E scheme, constitutes the instructions to be followed by the installation team that is responsible for installing the electronic equipment.)

3-5. In the interest of standardized procurement and installation, the equipment and materials shown on the SFEL (see par. 2-2) shall be utilized to the fullest possible extent in preparing the B/M. Substitutions are permitted only when necessitated by local conditions or operational considerations.

3-6. SITE SELECTION.

3-7. GENERAL. Even with the uhf equipment in peak operating condition, system performance can be no better that the site characteristics allow. The importance of proper siting of a uhf station cannot be overstressed. Proper siting means choosing the best possible location, all factors of the system being considered. A brief explanation of the problem is given below. Siting teams and others needing more detailed information should refer to T.O. 31-1-14, "Siting Procedure for UHF Ground-to-Air Communication Equipment."

3-8. The propagation of uhf radio waves is similar to the propagation of light rays, and many physical laws which apply to light apply also to uhf radio waves. These waves usually are dependable for communication within line-of-sight range. (The actual range extends somewhat beyond the optical line-of-sight range, owing to atmospheric refraction.) The selection of a suitable site is based primarily upon choosing one of the highest points of land in a specified area, from which the radio range in any direction will be adequate. However, if any obstruction to the radio path must be tolerated, the site should be so located that the effect of the obstruction will be in the sector of least importance.

3-9. All possible sources of electrical interference, such as radio communication circuits, high-voltage power lines, and highway traffic motor ignition, should be recorded. Interference may be investigated more thoroughly by operating a uhf receiver or noise meter at the site.

3-10. Ideally, other things being equal, the best site will be the one having largest coverage. In practice, however, other factors will have a bearing on the selection. For example, the site with largest coverage may be inaccessible from a logistic viewpoint, in which case a site having somewhat smaller coverage will be satisfactory if it meets other requirements. Usually higher headquarters will weigh the determining factors and decide which site is to be used.

3-11. SITING CRITERIA. The following criteria for site location are applicable to the remote transmitter and receiver installations. These criteria relate only to optimum technical performance of the equipment.

a. The area must be free of hills, cliffs, buildings, and other nonremovable obstructions that would interfere with line-of-sight path between antenna and aircraft.

b. If flat level ground is not available, a gently sloping area should be selected. In mountainous areas, the highest possible elevation should be selected to avoid shadowing effects.

c. The plot itself must be capable of being cleared of trees and brush.

d. The building should be located as near as possible to the center of the plot.

e. The ground should be free of large rocks that might interfere with the antenna installation.

f. It is suggested that the base contour map be consulted to determine that suitable coverage can be attained. Line-of-sight coverage to the following areas is required from antennas mounted between 35 and 70 feet above the ground:

(1) Runways and taxiways.

(2) Aircraft parking areas and hangar aprons.

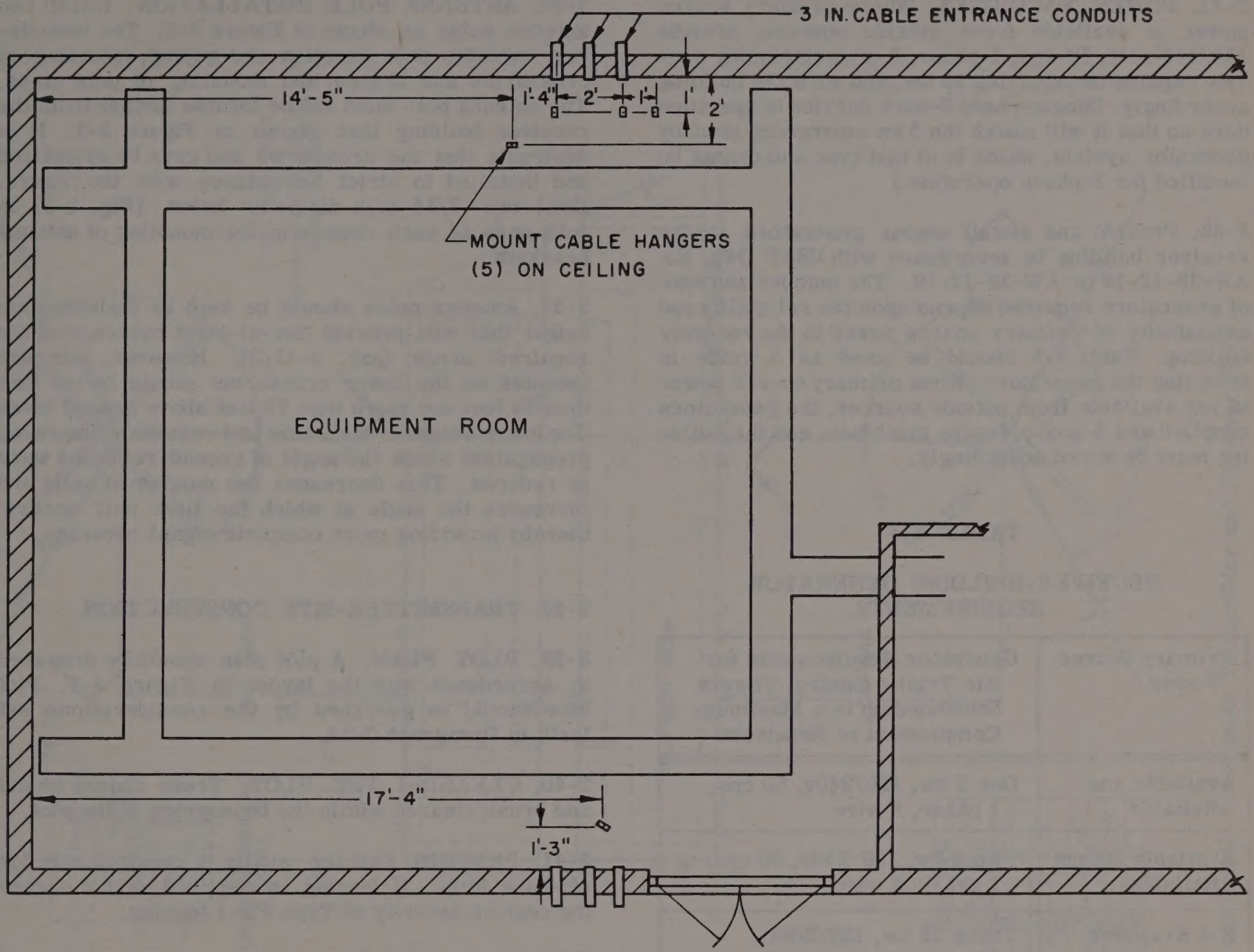

3 IN. CABLE ENTRANCE CONDUITS
14'-5"
1'-4"
2'
1'
1'
2'
MOUNT CABLE HANGERS (5) ON CEILING
EQUIPMENT ROOM
17'-4"
1'-3"

Figure 3-2. Cable Hanger Locations—Receiver Building

TABLE 3-2

RECEIVER-BUILDING POWER REQUIREMENTS

A. Receiver Building without RAPCON.

MINIMUM FACILITY

Equipment	Load
4 R-361/GR	0.5 kw
1 R-278/GR	0.3 kw
1 BC-639	0.067 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

MAXIMUM FACILITY

Equipment	Load
7 R-361/GR	0.875 kw
2 R-278/GR	0.6 kw
3 BC-639	0.2 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

B. Receiver Building with RAPCON.

MINIMUM FACILITY

Equipment	Load
10 R-361/GR	1.25 kw
3 R-278/GR	0.9 kw
1 BC-639	0.067 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

MAXIMUM FACILITY

Equipment	Load
14 R-361/GR	1.75 kw
4 R-278/GR	1.2 kw
6 BC-639	0.5 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

C. Voltage (commercial or base power available at site) . . . . 120/240 volts ±5%, 1 phase
Voltage (commercial or base power not available at site) . . . . 120/208 volts ±5%, 3 phase

D. Frequency . . . . 60 cps ±5%

3-31. POWER FACILITIES. Where primary source power is available from outside sources, provide 120/240-volt, 60-cps, 1-phase, 3-wire incoming service capable of supplying 15 kw, and wire the building accordingly. (Single-phase 3-wire service is specified here so that it will match the 5 kw emergency standby generator system, which is of that type and cannot be modified for 3-phase operation.)

3-32. Provide and install engine generators in the receiver building in accordance with USAF Dwg. No. AW-38-12-18 or AW-38-12-19. The number and size of generators required depend upon the reliability and availability of primary source power to the receiver building. Table 3-3 should be used as a guide in selecting the generators. When primary source power is not available from outside sources, the generators supplied are 3-phase 4-wire machines, and the building must be wired accordingly.

TABLE 3-3

RECEIVER-BUILDING GENERATOR REQUIREMENTS

Primary Source Power	Generator Requirements for Air Traffic Control Towers Scheduled up to a Maximum Complement of Receivers
Available and Reliable	One 5 kw, 120/240v, 60 cps, 1 phase, 3 wire
Available but not Reliable	Two 5 kw, 120/240v, 60 cps, 1 phase, 3 wire
Not Available	Three 15 kw, 120/208v, 60 cps, 3 phase, 4 wire

3-33. The incoming commercial or base power source cable must be installed underground for a minimum distance of 150 feet from the receiver building to minimize distortion of antenna patterns.

3-34. FUEL FACILITIES. Provision must be made for storing fuel and supplying it to the engine generators located in the receiver building. The station facility consisting of equipment listed in SFEL FE-1-01 or FE-2-02 is suitable for this purpose. These facilities consist of either a 275-gallon aboveground tank or a 275- or 1,000-gallon underground tank. They include the associated piping, pumps, fittings, and fixtures for moving fuel from the tank to the generators. The fuel facility should be installed in accordance with USAF Dwg. No. AW-78-18-01 and specification AW-78-18-01-53CE. Although the aboveground installation should be used wherever possible, the 1,000-gallon underground tank is recommended for locations without primary source power. When the fuel facility is installed, all safety precautions must be taken and all safety regulations must be adhered to.

3-35. INTERSITE CONTROL CABLES. See Paragraphs 3-67, 3-68, and 3-69.

3-36. ANTENNA POLE INSTALLATION. Install two antenna poles as shown in Figure 3-3. The installation includes pole erection and guying, mounting of crossarms and braces, and mounting of pole steps. The antenna pole must not be located farther from the receiver building than shown in Figure 3-3. It is desirable that the crossarms and guys be orientated and installed in strict accordance with the figure. Drill two 7/16-inch-diameter holes (Fig. 3-3) in both ends of each crossarm for mounting of antenna brackets.

3-37. Antenna poles should be kept to the minimum height that will provide line-of-sight coverage of the required areas (par. 3-11(f)). However, antennas mounted on the lower crossarms should be not less than 35 feet nor more than 70 feet above ground level. The lower height is desirable and results in improved propagation since the angle of ground-reflected wave is reduced. This decreases the number of nulls and increases the angle at which the first null occurs, thereby providing more complete signal coverage.

3-38. TRANSMITTER-SITE CONSTRUCTION.

3-39. PLOT PLAN. A plot plan should be prepared in accordance with the layout in Figure 3-1. Plot size should be governed by the considerations set forth in Paragraph 3-14.

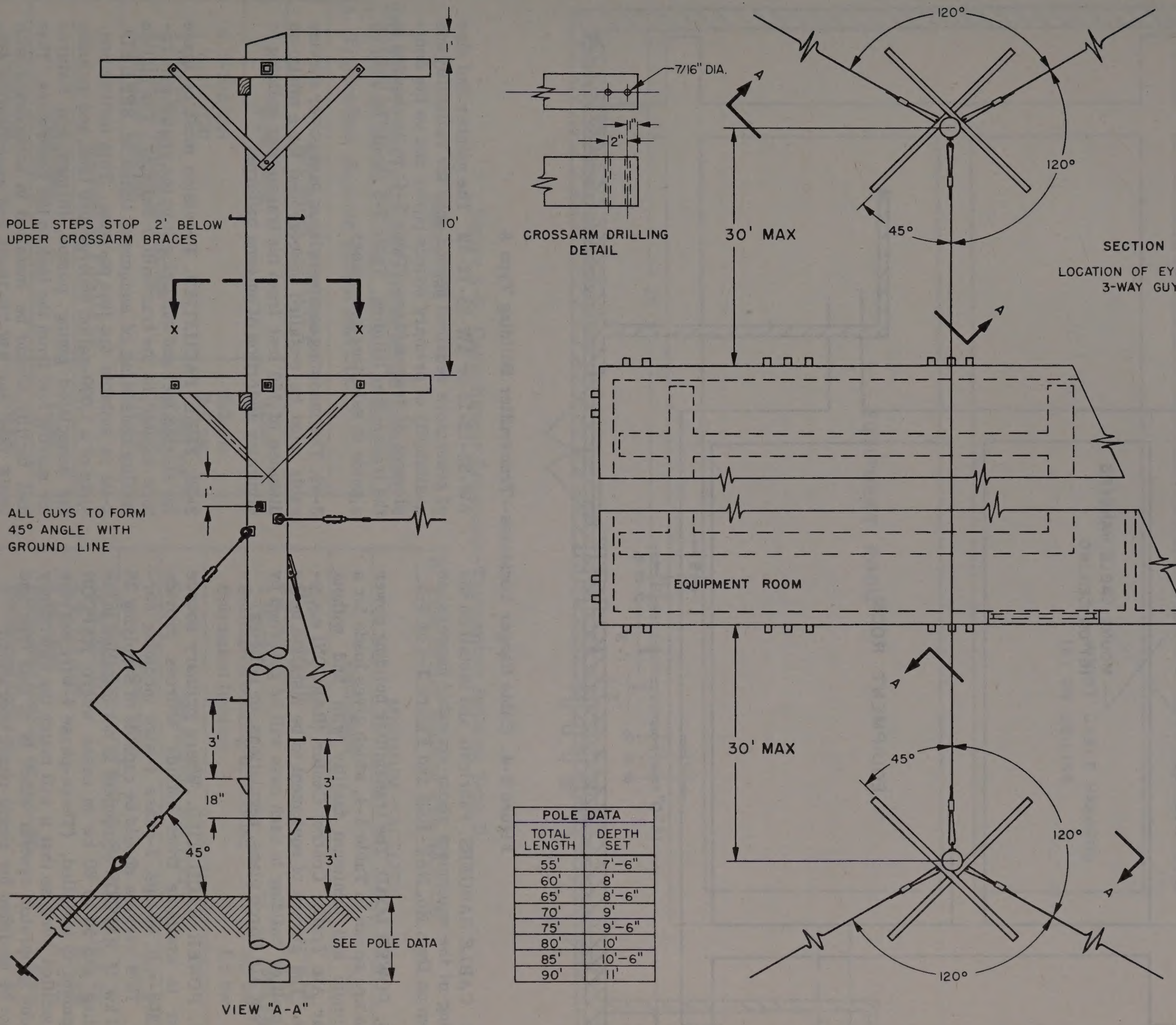
3-40. CLEARING THE PLOT. Trees should be cut and brush cleared within the boundaries of the plot.

3-41. FENCING. Fencing usually is required only for off-base sites. If fencing is required, do not exceed the cost or security of Type FE-1 fencing.

3-42. ACCESS ROAD. An all-weather road should provide access to the building. A vehicle turnabout area is required, and it should be located as near to the equipment building as practicable (Fig. 3-1).

3-43. USE OF EXISTING BUILDINGS. Existing buildings may be used to house the transmitting equipment and generator units if they are of suitable construction and are appropriately located. Installations made in existing structures should follow as closely as possible the standard installation plans described herein.

3-44. TRANSMITTER BUILDING. When existing buildings are not available, provide a type A or B building, constructed in accordance with USAF Dwg. No. AW-38-12-18 or AW-38-12-19. The main difference between these buildings is that the equipment room of the type B building is 10 feet longer than that of the type A building. Both buildings have alternate floor plans to permit enlarging the single-unit generator room to accommodate two or three engine generators. The choice of basic buildings depends upon the anticipated expansion of this facility in excess of basic requirements. The size of the generator room and the number of generator pads to be installed will depend upon the number of generators required, as discussed in Paragraph 3-48.


POLE STEPS STOP 2' BELOW UPPER CROSSARM BRACES
1'
10'
X
X
1'
ALL GUYS TO FORM 45° ANGLE WITH GROUND LINE
3'
18"
3'
3'
45°
SEE POLE DATA
VIEW "A-A"
7/16" DIA.
1"
2"
CROSSARM DRILLING DETAIL
30' MAX
30' MAX
EQUIPMENT ROOM
A
A
A
A
120°
120°
45°
120°
120°
45°
SECTION "X-X"
LOCATION OF EYEBOLTS FOR 3-WAY GUYING

POLE DATA	
TOTAL LENGTH	DEPTH SET
55'	7'-6"
60'	8'
65'	8'-6"
70'	9'
75'	9'-6"
80'	10'
85'	10'-6"
90'	11'

Figure 3-3. Antenna Pole Plans and Details for Remote Transmitter and Receiver Sites

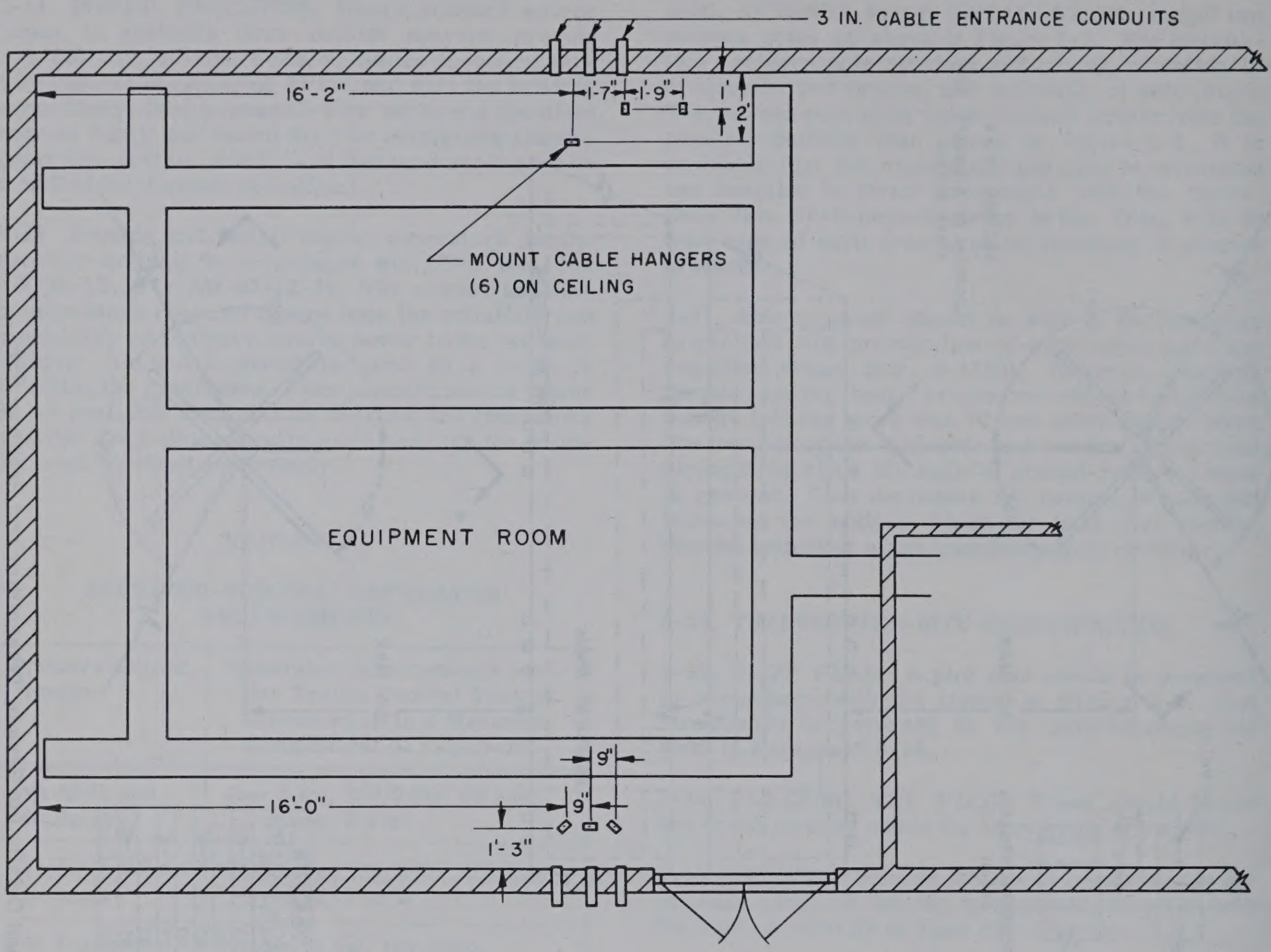


Figure 3-4. Cable Hanger Locations—Transmitter Building Type A

3-45. CABLE HANGERS. Fabricate and install on the ceiling of the equipment room six cable hangers, as shown on Dwg. No. NAV-3008 and Figure 3-4 or 3-5.

3-46. POWER LOAD. The transmitter building power loads are shown in Table 3-4, which gives loads for a maximum and minimum facility with and without Radar Air Traffic Control Center (RAPCON) equipment. The amount of equipment to be installed in the transmitter building in each case will be governed by current Air Force plans, regulations, or policies.

3-47. POWER FACILITIES. Where primary source power is available from outside sources provide 120/208-volt, 60-cps, 3-phase 4-wire incoming service. This service should be capable of supplying 25 to 30 kw if RAPCON equipment is not installed in the building and 50 to 60 kw in cases where RAPCON equipment is installed. (Three-phase 4-wire service is specified here so that it will match the emergency standby generator system which is of that type and cannot be modified for single-phase operation.)

3-48. Provide and install engine generators in the transmitter building in accordance with USAF Dwg. No. AW-38-12-18 or AW-38-12-19. The number and size of generators required depend upon the reliability and availability of primary source power and on the complement of transmitters (Table 3-4) to be housed in the transmitter building. Table 3-5 should be used as a guide in selecting generators.

3-49. The incoming commercial or base power service cable must be installed underground for a minimum distance of 150 feet from the transmitter building to minimize distortion of antenna patterns.

3-50. FUEL FACILITIES. Provision must be made for storing fuel and supplying it to the engine generators located in the transmitter building. The station facility consisting of equipment listed in SFEL FD-2-02 is suitable for this purpose. This facility consists of a 1,000-gallon underground tank, and includes the associated piping, pumps, fittings, and fixtures for moving fuel from the tank to the generators. This fuel facility should be installed in accordance with USAF Dwg. No. AW-78-18-01 and specification AW-78-18-01-53CE. When the fuel facility is installed, all safety precautions must be taken and all safety regulations must be adhered to.

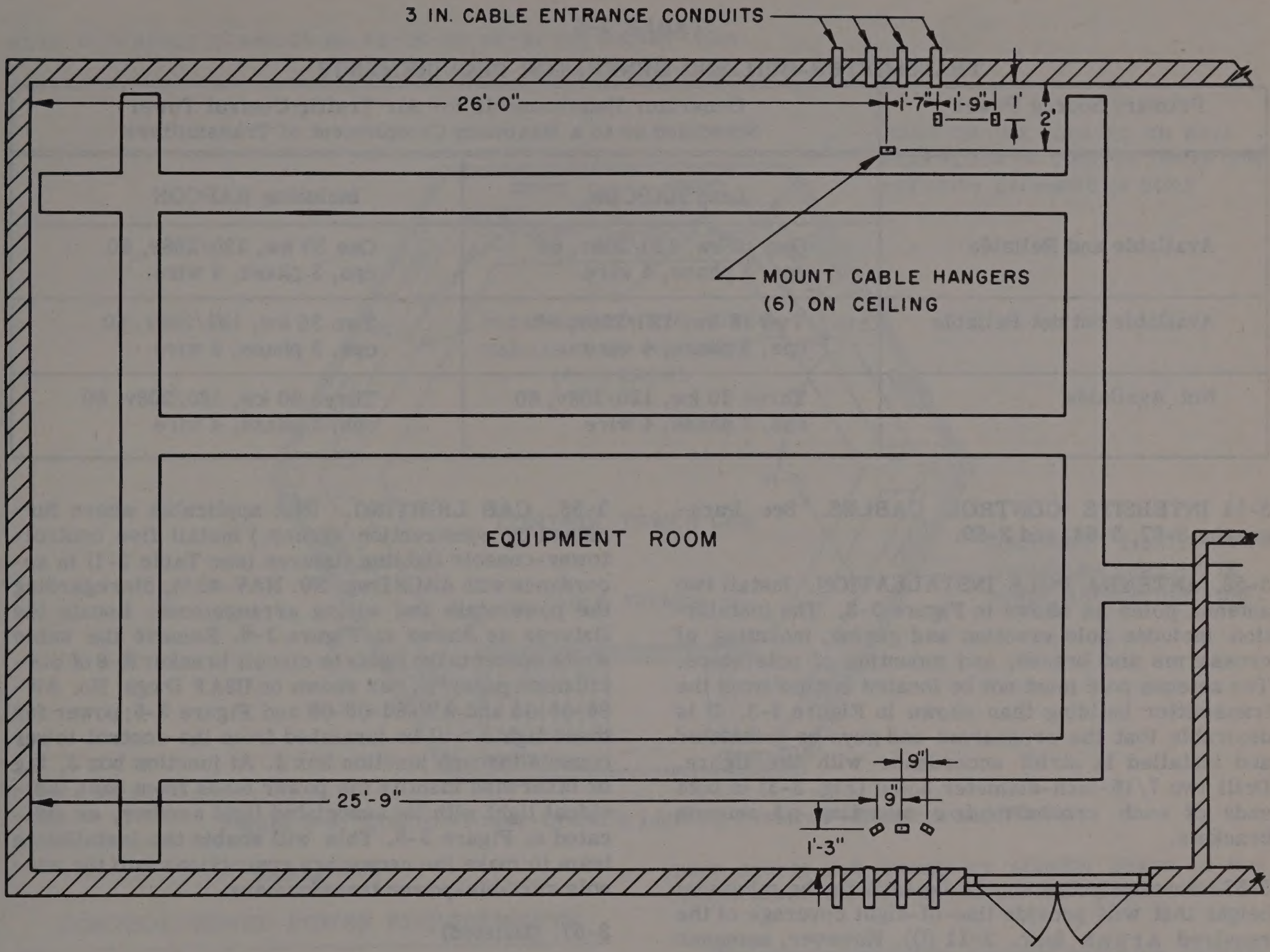

3 IN. CABLE ENTRANCE CONDUITS
26'-0"
1'-7"
1'-9"
1'
2'
MOUNT CABLE HANGERS
(6) ON CEILING
EQUIPMENT ROOM
9"
25'-9"
9"
1'-3"

Figure 3-5. Cable Hanger Locations—Transmitter Building Type B

TABLE 3-4

TRANSMITTER-BUILDING POWER REQUIREMENTS

A. Transmitter Building without RAPCON.

MINIMUM FACILITY	
Equipment	Load
4 T-282/GR	5.2 kw
1 T-217/GR	2.0 kw
1 BC-640	.867 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

MAXIMUM FACILITY	
Equipment	Load
7 T-282/GR	9.0 kw
2 T-217/GR	4.0 kw
3 BC-640	2.5 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

B. Transmitter Building with RAPCON.

MINIMUM FACILITY	
Equipment	Load
10 T-282/GR	13.0 kw
3 T-217/GR	6.0 kw
1 BC-640	.867 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

MAXIMUM FACILITY	
Equipment	Load
14 T-282/GR	18.2 kw
4 T-217/GR	8.0 kw
6 BC-640	5.0 kw
Estimated heating or cooling	7.5 kw
Estimated lighting	1.5 kw

C. Voltage . . . . 120/208 volts ±5%, 3 phase

D. Frequency . . . . 60 cps ±5%

TABLE 3-5

TRANSMITTER-BUILDING GENERATOR REQUIREMENTS

Primary Source Power	Generator Requirements for Air Traffic Control Tower Scheduled up to a Maximum Complement of Transmitters	
	Less RAPCON	Including RAPCON
Available and Reliable	One 15 kw, 120/208v, 60 cps, 3 phase, 4 wire	One 30 kw, 120/208v, 60 cps, 3 phase, 4 wire
Available but not Reliable	Two 15 kw, 120/208v, 60 cps, 3 phase, 4 wire	Two 30 kw, 120/208v, 60 cps, 3 phase, 4 wire
Not Available	Three 30 kw, 120/208v, 60 cps, 3 phase, 4 wire	Three 60 kw, 120/208v, 60 cps, 3 phase, 4 wire

3-51 INTERSITE CONTROL CABLES. See Paragraphs 3-67, 3-68, and 3-69.

3-52. ANTENNA POLE INSTALLATION. Install two antenna poles as shown in Figure 3-3. The installation includes pole erection and guying, mounting of crossarms and braces, and mounting of pole steps. The antenna pole must not be located farther from the transmitter building than shown in Figure 3-3. It is desirable that the crossarms and guys be orientated and installed in strict accordance with the figure. Drill two 7/16-inch-diameter holes (Fig. 3-3) in both ends of each crossarm for mounting of antenna brackets.

3-53. Antenna poles should be kept to the minimum height that will provide line-of-sight coverage of the required areas (par. 3-11 (f)). However, antennas mounted on the lower crossarms should not be less than 35 feet nor more than 70 feet above ground level. The lower height is desirable and results in improved propagation since the angle of ground-reflected wave is reduced. This decreases the number of nulls and increases the angle at which the first null occurs, thereby providing more complete signal coverage.

3-54. AIR-TRAFFIC-CONTROL-TOWER CONSTRUCTION.

3-55. GENERAL. As stated in Paragraph 3-3, it is assumed for purposes of this handbook that a standard control tower, constructed in accordance with USAF Dwg. No. AW-86-06-05 or AW-86-06-06 and AACS Dwg. No. NAV-4000, is already available, so that the only control-tower construction discussed here is that required for adapting a standard tower to the needs of this facility. Control-tower site construction given herein includes cab lighting, and power, fuel, and telephone facilities.

NOTE

Control towers that do not conform with the standard drawings cited above must be modified to permit the construction and installation described in this handbook.

3-56. CAB LIGHTING. (Not applicable where furnished by construction agency.) Install five control-tower-console lighting fixtures (see Table 2-1) in accordance with AACS Dwg. N0. NAV-4014, disregarding the powerstats and wiring arrangement. Locate the fixtures as shown in Figure 3-6. Remove the cable which connects the lights to circuit breaker H-8 of distribution panel "H," as shown on USAF Dwgs, No. AW-86-06-05 and AW-86-06-06 and Figure 3-6; power for these lights will be furnished from the control-tower console through junction box J. At junction box J, tag or otherwise identify the power leads from each individual light with its associated light number, as indicated in Figure 3-6. This will enable the installation team to make the necessary connections into the console variable-power transformers.

3-57. (Deleted)

3-58. POWER-TRANSFER UNIT FOR EMERGENCY AIR-TRAFFIC-CONTROL LAMPS. Fabricate and assemble the power-transfer unit on a 7-in. x 19-in. panel as shown on AACS Dwg. No. NAV-4016. Connect a 4-ft line cord to terminals No. 1 and No. 2 as shown on the drawing. Omit the line cord connected to terminals No. 3 and No. 4. Place the assembled power-transfer unit in the control-tower cab.

3-59. CONTROL PANEL FOR LOCAL STANDBY EQUIPMENT. Fabricate and assemble one control panel for local standby equipment as shown on AACS Dwg. No. NAV-4010, excluding Radio Control BC-1314 and Radio Set Control C-628/ARC-27. These controls will be installed during the installation phase (Sect. IV). Place the assembled control panel in the control-tower cab.

3-60. (Deleted)

3-61. POWER LOAD. The control-tower power load is shown in Table 3-6. This table does not include power requirements for an elevator or for heating, air-conditioning equipment or lighting and convenience outlets in additional room levels in the inclosed type control tower.

3-62. POWER FACILITIES. Provide and install pri-

NOTE: REFERENCE DRAWINGS: AW-86-06-05, AW-86-06-06, NAV-4014

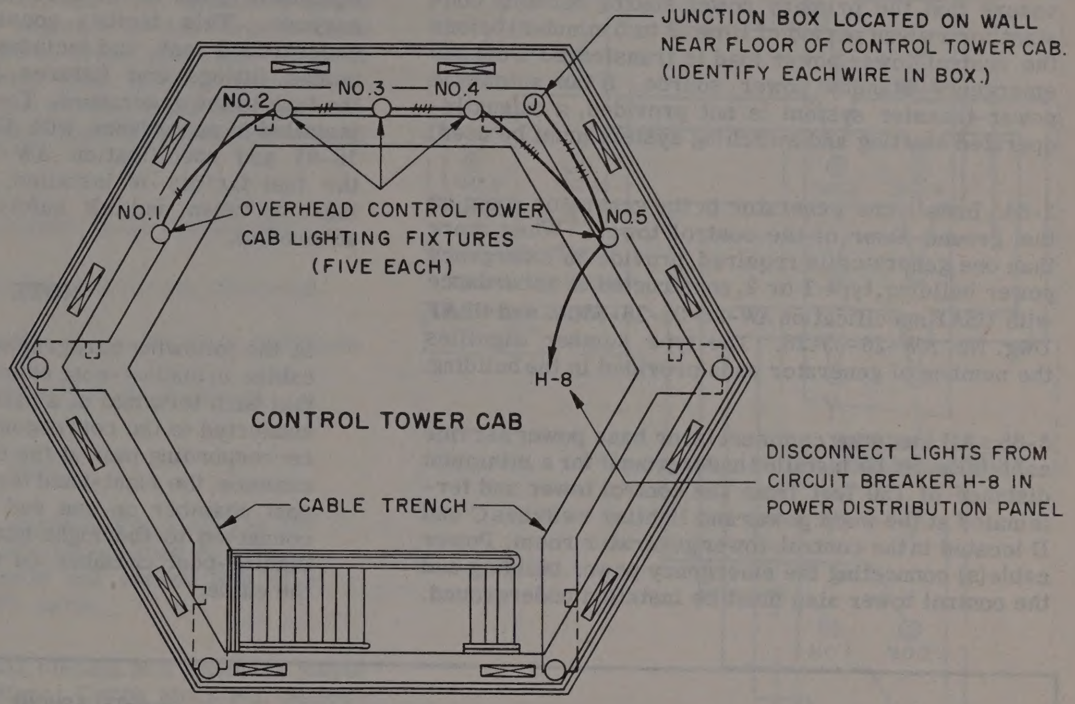

JUNCTION BOX LOCATED ON WALL NEAR FLOOR OF CONTROL TOWER CAB. (IDENTIFY EACH WIRE IN BOX.)
NO. 2
NO. 3
NO. 4
J
NO. 1
OVERHEAD CONTROL TOWER CAB LIGHTING FIXTURES (FIVE EACH)
NO. 5
H-8
CONTROL TOWER CAB
DISCONNECT LIGHTS FROM CIRCUIT BREAKER H-8 IN POWER DISTRIBUTION PANEL
CABLE TRENCH

Figure 3-6. Control-Tower-Console Lighting Fixtures—Location and Wiring

TABLE 3-6

CONTROL-TOWER POWER REQUIREMENTS

	Load
a. Roof	
Obstruction lights	0.4 kw
Convenience outlets	0.5 kw
b. Cab	
Light guns	0.2 kw
Lighting	0.9 kw
Console	1.0 kw
Minor circuits	1.0 kw
Fan	0.5 kw
Water cooler	0.2 kw
Convenience outlets	1.0 kw
Augmentation	1.0 kw
c. Equipment Room	
Electronic equipment	3.0 kw
Lighting	0.7 kw
Convenience outlets	1.0 kw
Augmentation	1.0 kw
d. Junction Room	
Lighting	0.6 kw
Convenience outlets	1.0 kw
e. Generator Room	
Lighting	0.6 kw
Convenience outlets	1.0 kw

Voltage .... 120/208 volts ±5%, 3 phase
Frequency .... 60 cps ±5%

mary source and emergency standby power to the control tower to conform with the following conditions:

a. Where primary source power is available, provide a 3-phase, 4-wire, 60-cps incoming service to the control tower capable of supplying 50 to 60 kw at 120/208 volts.

b. Where reliable primary source power is available, provide one 15-kw, 120/208-volt, 60-cps, 3-phase, 4-wire emergency generator to supply the essential lighting and electronic power requirements during primary power outages.

c. Where primary power is available but not reliable, provide two 15-kw, 120/208-volt, 60-cps, 3-phase, 4-wire emergency generators to supply the essential lighting and electronic power requirements during primary power outages.

d. Where primary power is not available, provide three 50- to 60-kw, 120/208-volt, 60-cps, 3-phase, 4-wire generators to supply the entire control-tower power requirement including electronic, lighting, and air-conditioning loads.

3-63. The 15-kw emergency generators should be provided with an automatic power-transfer system, which in the event of primary power failure will start the generator and switch the essential control-tower power load onto the generator. Upon restoration of primary source power, the automatic power-transfer system will transfer the control-tower load back to the primary source and shut down the generator. To prevent cycling, a sampling device should be incorporated in the automatic power-transfer system to assure that the primary power source remains constant for a given period of time (3 to 5 minutes) before the control-tower power load is transferred from the emergency standby power source. If an automatic power-transfer system is not provided, a manually-operated starting and switching system must be used.

3-64. Install one generator in the generator room on the ground floor of the control tower. When more than one generator is required, provide an emergency power building, type 1 or 2, constructed in accordance with USAF specification AW-26-03-26-53CE and USAF Dwg. No. AW-26-03-26. The type number signifies the number of generator pads provided in the building.

3-65. All incoming commercial or base power service cable(s) must be installed underground for a minimum distance of 150 feet from the control tower and terminated at the main power and lighting switches C and D located in the control-tower generator room. Power cable(s) connecting the emergency power building and the control tower also must be installed underground.

3-66. FUEL FACILITIES. Provision must be made for storing fuel and supplying it to the engine generators located in the control tower and the emergency power building. The station facility consisting of equipment listed in SFEL FD-2-02 is suitable for this purpose. This facility consists of a 1,000-gallon underground tank, and includes the associated piping, pumps, fittings, and fixtures for moving fuel from the tank to the generators. The fuel facility should be installed in accordance with USAF Dwg. No. AW-78-18-01 and specification AW-78-18-01-53CE. When the fuel facility is installed, all safety precautions must be taken and all safety regulations must be adhered to.

NOTE

In the following paragraphs, when terminating cables in binding-post chambers, make certain that each terminal of a pair at one chamber is connected to the corresponding terminal of the corresponding pair at the other chamber. For example, the right-hand terminals in a binding-post chamber on one end of a cable must be connected to the right-hand terminals in the binding-post chamber on the opposite end of the cable.

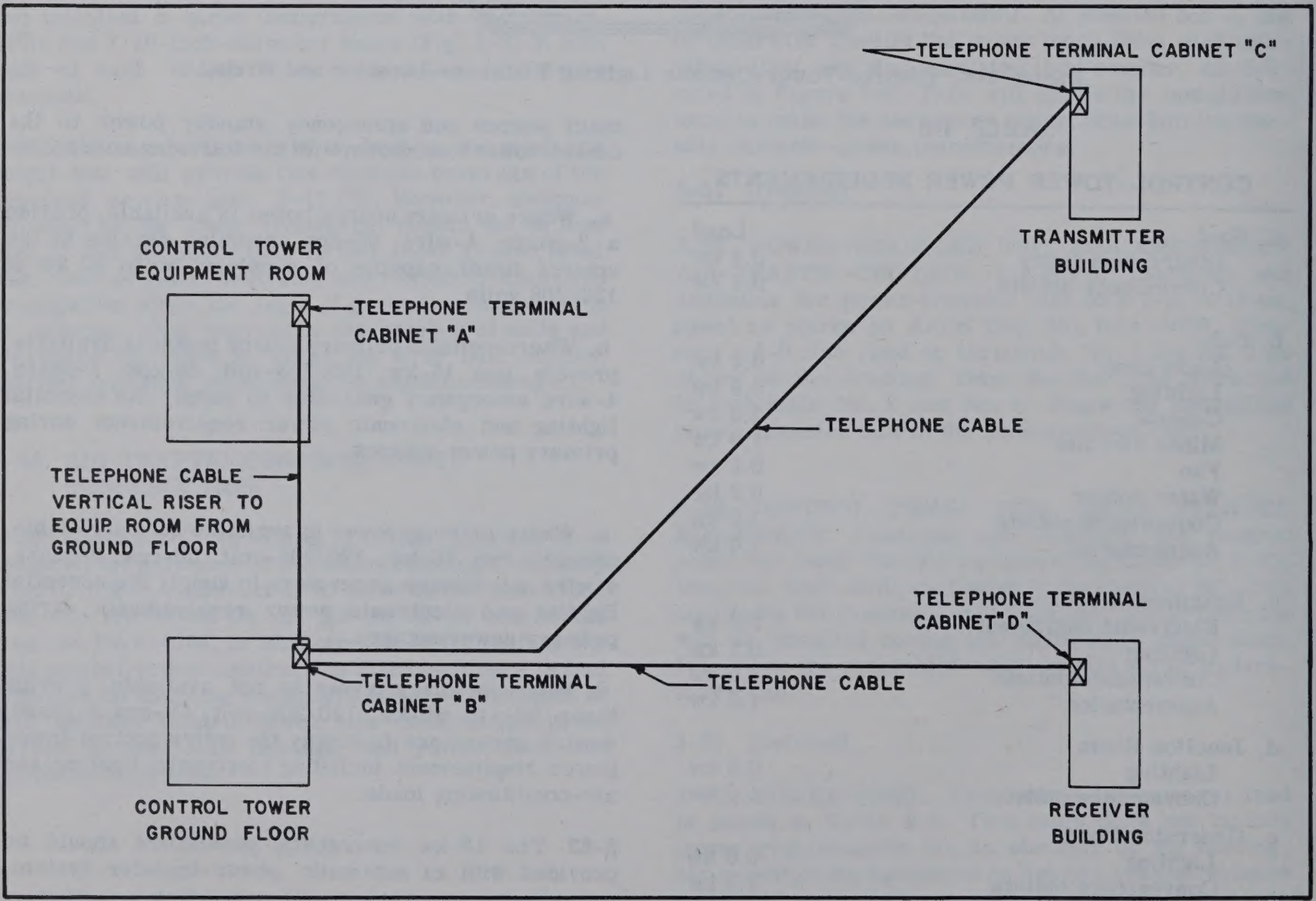

TELEPHONE TERMINAL CABINET "C"
TRANSMITTER BUILDING
CONTROL TOWER EQUIPMENT ROOM
TELEPHONE TERMINAL CABINET "A"
TELEPHONE CABLE
TELEPHONE CABLE VERTICAL RISER TO EQUIP. ROOM FROM GROUND FLOOR
TELEPHONE TERMINAL CABINET "D"
TELEPHONE TERMINAL CABINET "B"
TELEPHONE CABLE
CONTROL TOWER GROUND FLOOR
RECEIVER BUILDING

Figure 3-7. Telephone Cabling Requirements

3-67. INTERSITE CONTROL CABLES. Provide and install telephone terminal cabinets A, B, C, and D, unless installed by construction contract, in the two control tower locations and the remote sites, as shown in Figures 3-7, 4-3, 4-27, and 4-28. Cabinet B should normally be installed adjacent to the vertical cable duct system in the control tower generator room or the room in which outside plant cable is terminated. Necessary telephone and control cable should be installed by the appropriate agency upon notification of requirements.

a. Crosstalk—not to exceed 35 db below 6 mw

b. No. 22 AWG paired cable—5 miles maximum

c. Ground return (see Fig. 3-7)—20 ohms maximum

d. Dielectric breakdown—350V dc minimum

NOTE

When cable lengths exceeding 5 miles are required, use larger gage cable. Loop resistance and attenuation should not exceed that of 5 miles of No. 22 AWG cable.

3-68. Install one 51 pair binding post chamber (cable terminal TA-93/FT, Signal Corps Stock No. 5C560-51H) in each of telephone cabinets A, C, and D, for cross-connection purposes.

3-69. The base communication officer will be informed by the installation team (see notes at par. 4-45(d), 4-36(g), and 4-25(f)) when the OA-447/FSA-4 Interconnection Groups have been located and installed in the control-tower equipment room, remote transmitter building, and remote receiver building. At this time splice the OA-447/FSA-4 Interconnection Group stub cables to the 51-pair stub cable runs from telephone cabinets A, C, and D as outlined in Paragraph 3-68 above. In each case make certain that each terminal of a pair in the OA-447/FSA-4 terminal chamber is connected to the corresponding terminal of the corresponding pair in the binding-post chamber located in telephone cabinets A, C, and D.

3-70. Provide two telephone pairs between telephone cabinet A in the control-tower equipment room and the telephone cabinet in the Base Weather Building, as shown in Figure 3-8. Also provide two telephone pairs between the telephone cabinets located in the Base Weather and Base Operations Buildings. Make cross connections in the Base Weather telephone cabinet as shown in Figure 3-8. Tag the four telephone terminals in each of the three telephone cabinets, "Indicator Line No. 1," "Indicator Line No. 2,""Indicator Line No. 3," and "Indicator Line No. 4," respectively, as shown in Figure 3-8, for later identification by the installation team.

3-71. TELEPHONE FACILITIES. Standard telephone lines from the air traffic control tower to the following locations will be provided by the base concerned:

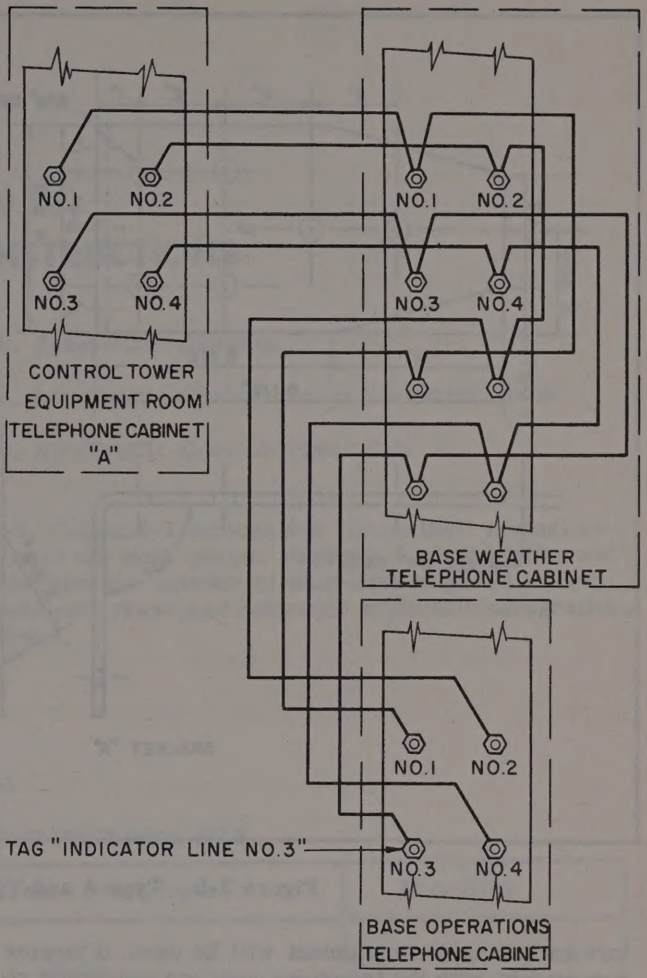


Figure 3-8. Field-Condition-Indicator Lines

a. Air Route Traffic Control Center.

b. Base Operations.

c. Air Weather Service.

d. RAPCON and/or GCA.

e. Direction Finding Facility (if remotely located).

f. Flight Service Center.

NOTE

Any other land line terminations necessary to perform the air-traffic-control-tower function will be included as required by the base concerned.

3-72. Telephone equipment keybox 102A will be used for both certified and noncertified bases, as well as for overseas installations, with the following exception: where foreign telephone companies provide the telephone service and have keybox equipment that is similar or equivalent to the 102A type keybox, the

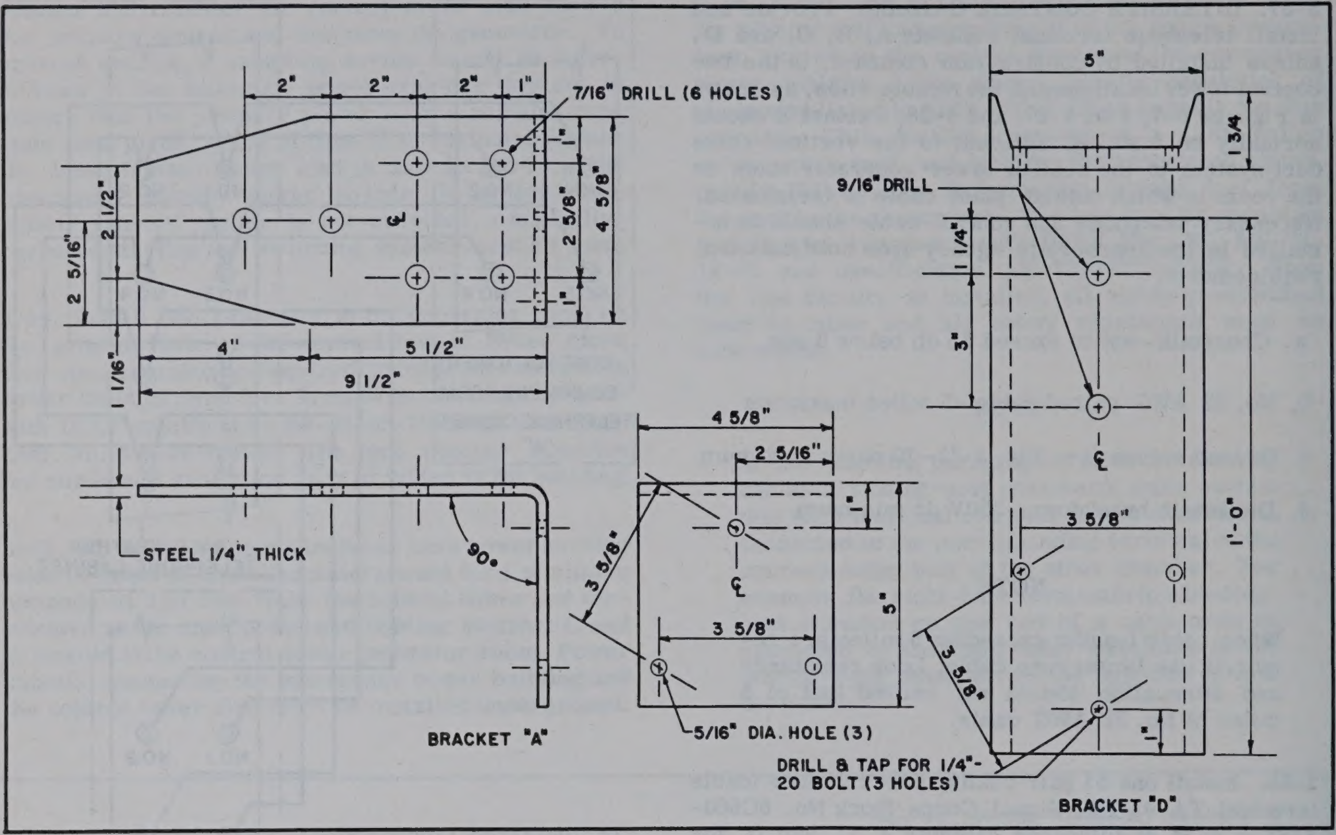

2"
2"
2"
1"
7/16" DRILL (6 HOLES)
1"
2 1/2"
2 5/16"
℄
2 5/8"
4 5/8"
1"
4"
5 1/2"
9 1/2"
1 1/16"
STEEL 1/4" THICK
90°
BRACKET "A"
4 5/8"
2 5/16"
1"
3 5/8"
℄
5"
3 5/8"
5/16" DIA. HOLE (3)
DRILL & TAP FOR 1/4"-20 BOLT (3 HOLES)
5"
1 3/4
9/16" DRILL
1 1/4"
3"
℄
3 5/8"
1'-0"
3 5/8"
1"
BRACKET "D"

Figure 3-9. Type A and Type D Antenna Mounting Brackets

foreign company's equipment will be used, if theater agreements with the telephone company concerned so state.

3-73. OBSTRUCTION LIGHTING AND MARKING.

3-74. Obstruction lighting must be installed by Base Air Installation Office as required by AFR 91-14. Obstruction marking must comply with the requirements of AFR 91-19.

3-75. ANTENNA MOUNTING BRACKETS.

3-76. Fabricate ten type A and two type D antenna mounting brackets in accordance with Figure 3-9 and Drawing NAV-3004B. Deliver these brackets to the appropriate installation team.

SECTION IV
INSTALLATION INSTRUCTIONS

4-1. INTRODUCTION

4-2. This section contains complete instructions for installation, test, and adjustment of the standard Control-Tower Facility and is intended primarily for use by the installation teams that are responsible for installing the equipment.

4-3. The facility is installed in the following locations:

a. Receiver Building

b. Transmitter Building

c. Air-Traffic-Control-Tower Equipment Room

d. Air-Traffic-Control-Tower Cab

4-4. Tables 4-1 through 4-6 list in their normal sequence the work phases required for installation and test, give the number of man-days required to complete each phase, and reference applicable paragraphs herein.

TABLE 4-1

INSTALLATION SEQUENCE FOR RECEIVER SITE

Installation Phases	Reference Paragraphs	Man-Days
Sort and identify receiver-site equipment	4-14	3
Move equipment to site and unpack	4-18	7
Assemble MT-686/GR racks	4-19 thru 4-23	1
Install electronic equipment	4-24, 4-25	2-1/2
Install cable and wiring	4-26, 4-27	6
Install antennas	4-28, 4-29	11
	TOTAL ESTIMATED MAN-DAYS	30-1/2

TABLE 4-2

INSTALLATION SEQUENCE FOR TRANSMITTER SITE

Installation Phases	Reference Paragraphs	Estimated Man-Days
Sort and identify transmitter-site equipment	4-14	3-1/2
Move equipment to site and unpack	4-32	9
Assemble MT-686/GR racks	4-33, 4-34	1-1/2
Install electronic equipment	4-35, 4-36	3-1/2
Install cable and wiring	4-37, 4-38	9-1/2
Install antennas	4-39, 4-40	12-1/2
	TOTAL ESTIMATED MAN-DAYS	39-1/2

TABLE 4-3

INSTALLATION SEQUENCE FOR CONTROL-TOWER EQUIPMENT ROOM

Installation Phases	Reference Paragraphs	Estimated Man-Days
Sort and identify equipment for control tower	4-14	2
Move equipment to control-tower equipment room and unpack	4-43	4
Install electronic equipment, wiring, and antennas	4-44, 4-45	12
	TOTAL ESTIMATED MAN-DAYS	18

TABLE 4-4

INSTALLATION SEQUENCE FOR CONTROL-TOWER CAB

Installation Phases	Reference Paragraphs	Estimated Man-Days
Sort and identify control-tower-cab equipment	4-14	1-1/2
Move equipment to control-tower cab and unpack	4-48	3
Install equipment and wiring	4-49, 4-50	18-1/2
Install field condition indicators	4-51, 4-52	2
	TOTAL ESTIMATED MAN-DAYS	25

TABLE 4-5

INSTALLATION SEQUENCE FOR INTERSITE CONTROL CABLE CONNECTIONS

Installation Phases	Reference Paragraphs	Estimated Man-Days
Make connections in control-tower equipment room and transmitter building	4-56	1
Make connections in control-tower equipment room and receiver building	4-57	1
	TOTAL ESTIMATED MAN-DAYS	2

TABLE 4-6

TEST AND ADJUSTMENT SEQUENCE FOR CONTROL-TOWER FACILITY

Installation Phases	Reference Paragraphs	Estimated Man-Days
Preliminary test and adjustment (receiver site)	4-59 thru 4-63	6
Preliminary test and adjustment (transmitter site)	4-64 thru 4-68	7
Final test and adjustment (control-tower, transmitter and receiver sites)	4-69 thru 4-79	8
	TOTAL ESTIMATED MAN-DAYS	21

4-5. TOOLS AND TEST EQUIPMENT.

4-6. Table 4-7 lists all test equipment required for installation and test of this facility. All tools required for installation and test are listed on the table or included in the kits listed thereon. All items shown on this table are included in the equipment allowance of Installation Squadrons, except items marked (*) and (**).

TABLE 4-7

TOOL AND TEST EQUIPMENT REQUIREMENTS

Description	Quantity
Drill, Electric, Portable, 1/2-in. Capacity	1 ea
Drills, Twist, Set of (1/8 in. to 1/2 in.)	1 ea
Generator, AF Signal, TS-382A/U	1 ea
Generator, RF Signal, TS-497B/UUR	1 ea
Grip MX-208/G	1 ea
Kit-Electrician (ECL 10-56-1)	1 ea
Kit-Radio and Radar Maintenance (ECL 10-30-1)	1 for each radio repairman and maintenance technician
Kit-Wire Maintenance (ECL 10-36-1)	2 ea
*Meter, Frequency, BC-638-A	1 ea
**Meter, Test, TS-80/U	1 ea
Multimeter TS-352A/U	1 ea
Telephone EE-8A	2 ea
**Test Equipment IE-19-( )	1 ea

*Listed on SFEL.

**Not listed on SFEL and not included in equipment allowance of Installation and Maintenance Squadrons.

4-7. ALLIED CONSTRUCTION REQUIREMENTS.

4-8. GENERAL. The base or command headquarters is responsible for providing the necessary allied construction (Sect. III). This construction, summarized below, should be completed before installation of the Control-Tower Facility is started.

4-9. RECEIVER SITE.

a. Clearing, leveling, fencing, access road (par. 3-24 through 3-26).

b. Receiver building (par. 3-27 and 3-28).

c. Cable hangers (par. 3-29).

d. Power and fuel facilities (par. 3-31 through 3-34).

e. Intersite control cables (par. 3-35).

f. Antenna poles (par. 3-36 and 3-37).

4-10. TRANSMITTER SITE.

a. Clearing, leveling, fencing, access road (par. 3-40 through 3-42).

b. Transmitter building (par. 3-43 and 3-44).

c. Cable hangers (par. 3-45).

d. Power and fuel facilities (par. 3-47 through 3-50).

e. Intersite control cables (par. 3-51).

f. Antenna poles (par. 3-52 and 3-53).

4-11. AIR-TRAFFIC-CONTROL-TOWER SITE.

a. Building and access road (par. 3-55).

b. Cab lighting (par. 3-56).

c. Air-Traffic light gun support straps.

d. Power-transfer unit for emergency air-traffic-control lamps (par. 3-58).

e. Control panel for local standby equipment (par. 3-59).

f. (Deleted)

g. Power and fuel facilities (par. 3-62 through 3-66).

h. Intersite control cables (par. 3-67 through 3-70).

4-12. MISCELLANEOUS.

a. Obstruction lights (par. 3-73).

b. Antenna mounting brackets (par. 3-75).

4-13. INSTALLATION PROCEDURES.

4-14. EQUIPMENT IDENTIFICATION AND SORTING. Identify and sort the equipment by installation sites. See Tables 4-8 through 4-11 for lists of materials to be transported to the three sites. To prevent damage during transportation to the sites, do not unpack the electronic equipment unless there is evidence of shipping damage. Report missing or damaged equipment to the local communications operating unit.

4-15. Unless impractical due to local conditions, only the approved standard procedures given in this technical order shall be used for installation and test of the facility. Furthermore, to assure reliability of the facility, installation workmanship must be of high quality. For example, whenever wood screws are used, pilot holes shall be drilled; nails shall not be substituted for screws; cables shall be properly secured by means of lacing or strapping.

TABLE 4-8

TYPICAL BOM FOR RECEIVER-SITE INSTALLATION

Description	Stock No.	Quantity
Amplifier AM-447A/G	1790-050140501	1 ea
Amplifier, AF, BC-730-C		8 ea
Antenna AT-197/GR	1700-201020803	5 ea
Antenna Equipment RC-81-C	1700-202634000	3 ea
Bolt, Hex-Head, 3/8-16, 1-1/2 in.	6700-054110	12 ea
Bolt, Machine, Hex-Head, 3/8-16, 5-1/2 in.	6700-054750	16 ea
Box Connector, 1/2-in.	8800-038200	2 ea
Braid, Wire, 1/2-in.	8860-050000-825	30 ft
Cable Assembly, Power, CD-883	1700-321914560	3 ea
Cable Assembly CX-1541/U	1700-322847600	5 ea
Cable Assembly CG-707/U	1700-322981799	5 ea
Cable Assembly CX-1540/U	1700-322847550	1 ea
Cable Assembly, Power	1760-322758000	1 ea
Cable, Coaxial, RG-17/U	8860-313600-211	615 ft
Cable, Coaxial, RG-34/U	8860-328000-211	375 ft
Cable, Messenger, 5/16-in.	1A115	50 ft
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	200 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	500 ft
Cable, Special-Purpose, 2-Cond., No. 22 AWG (Red, Black)	8860-398000-211	100 ft
Clamp, Guy-Wire, 3 Bolt	5B3461	4 ea
Clip, Loop-Type, 3/4-in.	6500-326650	300 ea
Clip, Wire-Rope	6700-195200	4 ea
Conduit, Electrical, MX-1174/U	1700-016091900	2 ea
Connector, Plug, PL-310	8850-463910	3 ea
Connector, Plug, UG-495/U	8850-470035	10 ea
Cord CD-881	1700-321914280	3 ea
Cord, Headset	3E3162-42	1 ea
Cord, Headset, CD-307	1790-321018000	1 ea
Cord, W.E. Co., No. 3P7D, 2 ft	3E3P7D	12 ea
Cord, W.E. Co., No. 3P15A, 6 ft	3E3P15A	12 ea
Frequency Meter BC-638-A	7CAC-318208-347	1 ea
Fuse, 15-Amp, 125V	3Z2615.3	2 ea
Headset HS-33	1790-207600000	1 ea
Hook, Guy, "J"	5B5283.5	2 ea
Interconnecting Group OA-447/FSA-4	1790-052261010	1 ea
Loudspeaker Panel Assembly	2Z6380	1 ea
Nut, Hex-Head, 1/4-20	6700-353499-5	15 ea
Nut, Hex-Head, 3/8-16	6700-356300	16 ea
Panel, Blank, Lacquered Steel, 19" x 1-3/4" x 1/8"	2Z6960-60	9 ea
Panel, Blank, Lacquered Steel, 19" x 5-1/4" x 1/8"	2Z6961.26	3 ea
Panel, Blank, Lacquered Steel, 19" x 12-1/4" x 1/8", Bud Radio PS-1256		7 ea
Panel J-390/GR	1700-349213697	3 ea
Panel MX-1125/G	1790-053122002	1 ea
Plug, Female, PL-306	3300-294087070	3 ea
Plug, Telephone, Type PJ-055-B	2Z7228A-55B	1 ea
Rack MT-453A/F	2Z7383-453A	2 ea
Rack MT-686/GR	1700-294732588	3 ea

TABLE 4-8—Continued

Description	Stock No.	Quantity
Receiver, Radio, BC-639	1700-217247500	3 ea
Receiver, Radio, R-361/GR	1700-215162072	4 ea
Receiver, Radio, R-278B/GR	1700-018781210	1 ea
Rectifier RA-42-B		3 ea
Receptacle	8850-495790	2 ea
Resistor, 680 ohms ±10%, 1/2 watt	3RC20BF681K	1 ea
Ring PF-69	5B9456	30 ea
Screw, Hex-Head, 1/4-20, 1-in.	6700-625720	15 ea
Screw, Lag, 1/2-in., 3-1/2 in.	5B10008-3.5	2 ea
Screw, Wood, Brass, No. 6-32, 1-1/2 in.	6700-815400	600 ea
Shelf, Desk, MX-1058/U	1700-295560744	3 ea
Strap Kit	6Z8565	1 ea
Tape, Scotch, No. 1	8800-873600-1	1 roll
Tape, Scotch, No. 2	8800-873600-2	1 roll
Tape, Scotch, No. 3	8800-873600-3	1 roll
Tape, Scotch, No. 4	8800-873600-4	1 roll
Tape, Scotch, No. 5	8800-873600-5	1 roll
Thimble	5B18045	2 ea
Washer, Flat, 3/8-in.	6700-356150	16 ea
Washer, Lock, 1/4-in.	6L71004	15 ea
Washer, Lock, 3/8-in.	6700-990550	28 ea
Wire, Copper, No. 6 AWG S.D.	1A806.9	50 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	50 ft

TABLE 4-9

TYPICAL BOM FOR TRANSMITTER-SITE INSTALLATION

Description	Stock No.	Quantity
Amplifier AM-447A/G	1790-050140501	1 ea
Antenna AT-197/GR	1700-201020803	5 ea
Antenna Equipment RC-81-C	1700-202634000	3 ea
Bolt, Hex-Head, 3/8-16, 1-1/2 in.	6700-054110	12 ea
Bolt, Machine, Hex-Head, 3/8-16, 5-1/2 in.	6700-054750	16 ea
Braid, Wire, 1/2-in.	8860-050000-825	40 ft
Cable Assembly CX-1539/U	1700-322847500	1 ea
Cable Assembly CX-1564/U	1700-322847650	1 ea
Cable Assembly CX-1541/U	1700-322847600	5 ea
Cable Assembly CX-2017/U	1700-015662802	4 ea
Cable Assembly CG-693/U	1700-322981797	9 ea
Cable Assembly CG-707/U	1700-322981799	5 ea
Cable Assembly, Power	1760-322758000	1 ea
Cable, Coaxial, RG-11/U	8860-337600-211	10 ft
Cable, Coaxial, RG-17/U	8860-313600-211	615 ft
Cable, Coaxial, RG-34/U	8860-328000-211	375 ft
Cable, Messenger, 5/16-in.	1A115	50 ft
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	250 ft
Cable, Power, 2-Cond., No. 14 AWG	8860-261000-475	10 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	600 ft
Cable, Special-Purpose, 2-Cond., No. 22 AWG (Red, Black)	8860-398000-211	100 ft
Clamp, Guy-Wire, 3-Bolt	5B3461	4 ea
Clip, Loop-Type, 3/4-in.	6500-326650	300 ea
Clip, Wire-Rope	6700-195200	4 ea
Conduit, Electrical, MX-1174/U	1700-016091900	2 ea
Connector, Plug, UG-495/U	8850-470035	10 ea

TABLE 4-9—Continued

Description	Stock No.	Quantity
Cord, Headset, CD-307	1790-321018000	1 ea
Cord, W.E. Co., No. 3P7D, 2 ft	3E3P7D	12 ea
Cord, W.E. Co., No. 3P15A, 6 ft	3E3P15A	12 ea
*Electrical Equipment Cabinet CY-1293/FSA-4		1 ea
Headset HS-33	1790-207600000	1 ea
Hook, Guy, J	5B5283.5	2 ea
Interconnecting Group OA-447/FSA-4	1790-052261010	1 ea
Jack UG-23B/U	8850-467474	3 ea
Loudspeaker Panel Assembly	2Z6380	1 ea
Microphone T-17	2B1617	1 ea
Modulator MD-129A/GR	1700-017966060	1 ea
Modulator MD-141A/GR	1700-017966050	4 ea
Nut, Hex-Head, 1/4-20	6700-353499-5	15 ea
Nut, Hex-Head, 3/8-16	6700-356300	16 ea
Panel, Blank, Lacquered Steel, 19" x 1-3/4" x 1/8"	2Z6960-60	9 ea
Panel, Blank, Lacquered Steel, 19" x 5-1/4" x 1/8"	2Z6961.26	3 ea
Panel, Blank, Lacquered Steel, 19" x 12-1/4" x 1/8", Bud Radio PS-1256		2 ea
Panel, Control, SB-270/FSA-4	1800-023475070	6 ea
Panel J-390/GR	1700-349213697	3 ea
Panel MX-1125/G	1790-053122002	1 ea
Plug UG-94A/U	8850-468669	3 ea
Plug, Female, PL-306	3300-294087070	3 ea
Plug UG-487/U		3 ea
Power Supply PP-992/FSA-4	1700-018522860	1 ea
Rack MT-686/GR	1700-294732588	3 ea
Ring PF-69	5B9456	30 ea
Screw, Hex-Head, 1/4-20, 1-in.	6700-625720	15 ea
Screw, Lag, 1/2-in., 3-1/2 in.	5B10008-3.5	2 ea
Screw, Wood, Brass, No. 6-32, 1-1/2 in.	6700-815400	600 ea
Shelf, Desk, MX-1058/U	1700-295560744	3 ea
**Shelf, Desk, MX-1430/FSA-4		1 ea
Tape, Scotch, No. 1	8800-873600-1	1 rl
Tape, Scotch, No. 2	8800-873600-2	1 rl
Tape, Scotch, No. 3	8800-873600-3	1 rl
Tape, Scotch, No. 4	8800-873600-4	1 rl
Tape, Scotch, No. 5	8800-873600-5	1 rl
Thimble	5B1-8045	2 ea
Transmitter, Radio, T-217A/GR	1700-019633005	1 ea
Transmitter, Radio, T-282/GR	1700-019634000	4 ea
Transmitter, Radio, BC-640-D	1700-222020350	3 ea
Washer, Flat, 3/8-in.	6700-356150	16 ea
Washer, Lock, 1/4-in.	6L71004	15 ea
Washer, Lock, 3/8-in.	6700-990550	28 ea
Wire, Copper, No. 6 AWG S.D.	1A806.9	60 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	80 ft
Wire, Electrical, No. 18 AWG, Insulated, Red	1B1318.2	100 ft

*This cabinet comprises the contents of Case No. 7 of the AN/FRC-19B. See note at bottom of Table 4-11.

**This shelf must be removed from Case No. 8 of the AN/FRC-19B. See note at bottom of Table 4-11.

TABLE 4-10

TYPICAL BOM FOR CONTROL-TOWER-EQUIPMENT-ROOM INSTALLATION

Description	Stock No.	Quantity
Amplifier AM-447A/G	1790-050140501	8 ea
Antenna AN-188	1700-202470560	1 ea
Bolt, Hex-Head, 3/8-16, 1-1/2 in.	6700-054110	8 ea
Box, Connector, 1/2-in.	8800-038200	4 ea
Braid, Wire, 1/2-in.	8860-050000-825	15 ft
Cable Assembly, Power, CD-809	1700-321859500	1 ea
Cable Assembly CD-1333	1700-322971538	1 ea
Cable Assembly, Power	1760-322758000	4 ea
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	150 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	325 ft
Cable, Special-Purpose, 2-Cond., No. 22 AWG (Red, Black)	8860-398000-211	200 ft
Case CS-80-A	2Z1880A	1 ea
Control, Radio, BC-1312	1700-211781580	1 ea
Cord, Headset, CD-307	1790-321018000	1 ea
Cord, W.E. Co., No. 3P7D, 2 ft	3E3P7D	16 ea
Cord, W.E. Co., No. 3P15A, 6 ft	3E3P15A	16 ea
Demagnetizer MX-1373/UN	1790-051256100	1 ea
Fuze, 15-Amp, 125V	3Z2615.3	4 ea
Headset HS-33	1790-207600000	1 ea
Interconnecting Group OA-447/FSA-4	1790-052261010	1 ea
Loudspeaker Panel Assembly	2Z6380	1 ea
Mounting N91002 (FT-314A)	1700-293185500	1 ea
Panel, Blank, Lacquered Steel, 19" x 12-1/4" x 1/8", Bud Radio PS-1256		4 ea
Panel MX-1125/G	1790-053122002	4 ea
Rack FT-244-A	1600-294712000	1 ea
Rack MT-453A/F	2Z7383-453A	4 ea
Radio Set AN/GRC-32B consists of:	1700-018613477	1 ea
1 Cabinet CY-1287/GRC, which contains: 1 Receiver-Transmitter RT-178/ARC-27		
1 Cabinet CY-1191/GRC-32A, which contains: 1 Power Supply PP-894/GRC-32B 1 Cable Assembly CX-2007A/U		
1 Cabinet CY-1288/GRC, which contains: 1 Cable Assembly CX-2053/U 1 Cable Assembly CX-2054/U 1 Cable Assembly CX-2163/U 1 Control Unit RM-52 1 Control Unit RM-53 1 Cord CD-307A 1 Headset HS-33A 1 Interconnecting Box J-499/GRC 1 Loudspeaker LS-166 1 Microphone T-17 1 Mounting MT-821/ARC-27		

TABLE 4-10—Continued

Description	Stock No.	Quantity
1 Radio Set Control C-626/ARC-27		
1 Radio Set Control C-628/ARC-27		
1 Spool DR-8 with Wire WD-1/TT (1/4 mile)		
1 Antenna Case CY-728/GRC, which contains:		
1 Antenna AT-197/GR		
1 Cable Assembly CG-690A/U		
1 Cable Assembly CG-895/U		
1 Bag, Antenna Mounting Hardware		
Receiver, Radio, BC-624-C	1600-217242100	1 ea
Recorder, RD-115/UN	1790-053560020	3 ea
Rectifier, RA-62-C	1700-371085000	1 ea
Reel, Tape Recording	1790-053560510	4 ea
Tape, Recording	8700-NSL4653	24 roll
Transmitter, Radio, BC-625-AM	1600-222006600	1 ea
Washer, Lock, 3/8-in.	6700-990550	8 ea
Wire, Copper, No. 6 AWG, S.D.	1A806.9	30 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	30 ft

TABLE 4-11

TYPICAL BOM FOR CONTROL-TOWER-CAB INSTALLATION

Description	Stock No.	Quantity
*Airport Control Tower Console AN/FRC-19B, consisting of:	1700-016092180	1 ea
Case No. 1		
(Field Lighting Control Group OA-228/-CRC)		
Case No. 2		
(Meterological Indicator Group OA-118/-CRC)		
Case No. 3		
(Flight Data Indicator Group OA-117/CRC)		
Case No. 4		
(Communications Group OA-119/CRC)		
Case No. 5		
(Control Monitor Group OA-115/CRC)		
Case No. 6		
(Field Condition Indicator ID-203/CRC)		
(Field Condition Indicator ID-298/CRC)		
Case No. 8		
(2 Desk, Log, FN-80/FRC)		
(1 Desk, Log, FN-82/FRC)		
(1 Flight Data Board PT-102/U)		
(1 Telephone Key Panel)		
(1 Telephone Key Panel Box)		

TABLE 4-11—Continued

Description	Stock No.	Quantity
(1 Alternate Wind Panel) (1 Set Intergroup Connecting Cables) (1 Copper Tubing and Muffler Assembly for Kollsman Indicator) (1 Set Equipment Spare Parts)		
Braid, Wire, 1/2-in.	8860-050000-825	15 ft
Box, Connector, 1/2-in.	8800-038200	9 ea
Cable, Power, 2-Cond., No. 14 AWG	8860-261000-475	190 ft
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	170 ft
Cable, Special-Purpose	1B3016-10.2	75 ft
Cable, Special-Purpose	1B3020-15	75 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	2,000 ft
Clamp, Cable, AN-3057-12	8850-100925	2 ea
Control Indicator C-806/GR	1700-211945116	1 ea
Control, Radio, BC-1314	1700-211781620	1 ea
Connector, Plug, AN-3106A-22-14S	8850-367162-52	1 ea
Connector Receptacle	8850-530300	4 ea
Cord, Headset, CD-307	1790-321018000	1 ea
Cover, Outlet Box, 4-in.	8800-285300	2 ea
Headset HS-33	1790-207600000	1 ea
Junction Box, 4-in. x 4-in., Square	8800-438260	2 ea
Kollsman Altimeter MS24134-( )	1600-NSL4296	1 ea
Nut, Machine, Brass, No. 8-32	6700-352750	4 ea
Plug PL-169	8850-660150	2 ea
Plug, Telephone, Type PJ-055-B	2Z7228A-55B	2 ea
Receptacle AN-3101A-22-14P	8850-368490-52	1 ea
Screw, Machine, Brass, No. 8-32, 3/4-in.	6700-725075-418	4 ea
Staple, Insulated, No. 6, 1/4-in. x 3/4-in.	8800-789000	600 ea
Tape, Scotch, No. 0	8800-873600-0	1 roll
Tape, Scotch, No. 1	8800-873600-1	1 roll
Tape, Scotch, No. 2	8800-873600-2	1 roll
Tape, Scotch, No. 3	8800-873600-3	1 roll
Tape, Scotch, No. 4	8800-873600-4	1 roll
Tape, Scotch, No. 5	8800-873600-5	1 roll
Tape, Scotch, No. 6	8800-873600-6	1 roll
Tape, Scotch, No. 7	8800-873600-7	1 roll
Tape, Scotch, No. 8	8800-873600-8	1 roll
Tape, Scotch, No. 9	8800-873600-9	1 roll
Wire, Copper, No. 6 AWG S.D.	1A806.9	10 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	25 ft
Wire, Electrical, No. 18 AWG, Insulated, Red	1B1318.2	25 ft

*The complete AN/FRC-19B console also includes Case No. 7, but this is used at the transmitter site and does not appear in the above list. Also, a Desk Shelf MX-1430/FSA-4 is removed from Case No. 8 for use at the transmitter site. See notes at bottom of Table 4-9.

4-16. RECEIVER-SITE INSTALLATION.

4-17. GENERAL. Proceed in accordance with the sequence indicated in Table 4-1. Carefully read all instructions in a particular installation procedure before beginning that installation. Then make the installation by following the steps in the order given herein.

4-18. UNPACKING RECEIVER-SITE EQUIPMENT. Use care to avoid damaging the equipment.

a. Move the equipment listed in Table 4-8 to the receiver site and place in the receiver building.

b. Unpack all components and check for shipping damage, loose connections, and mechanical misalignment, and remove all blocking.

c. Make necessary repairs or adjustments.

d. Report missing or damaged components to the local communications operating unit.

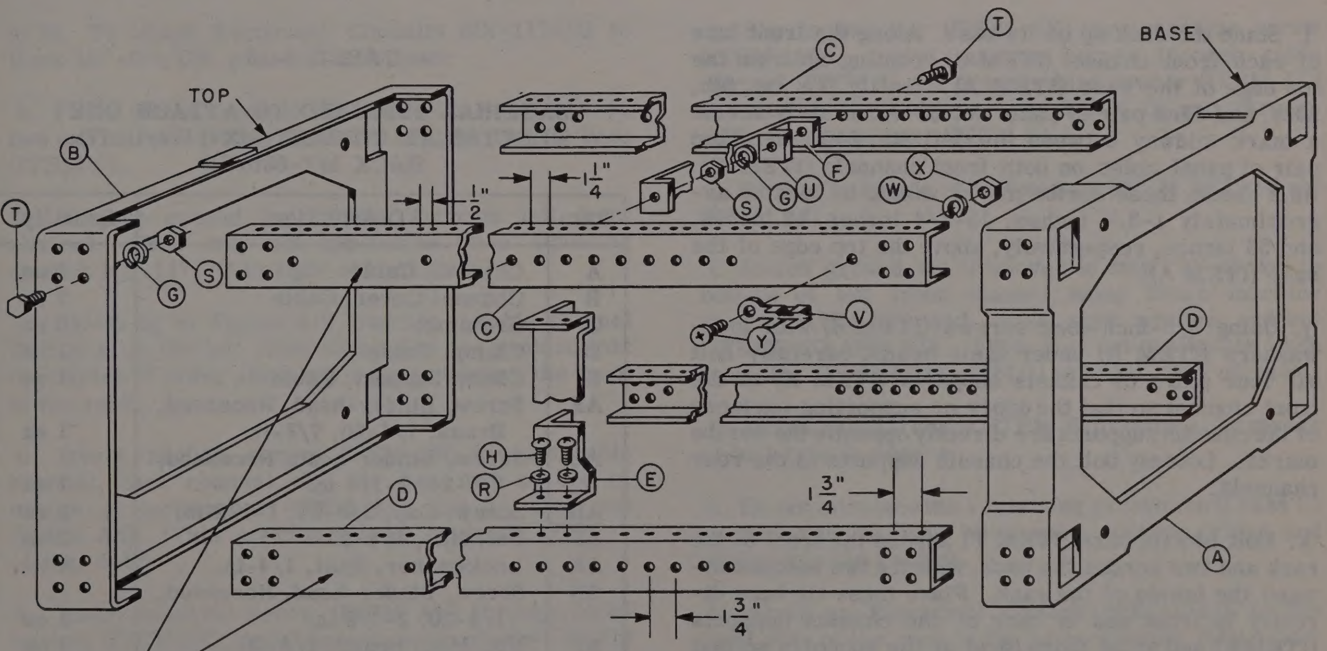
4-19. ASSEMBLY OF RACK MT-686/GR. (Fig. 4-1.) Table 4-12 lists the material supplied to assemble Rack MT-686/GR.

4-20. All of the major structural parts are marked with item numbers. The front channels (ITEM C) are symmetrically punched and may be used in either the right-hand or left-hand positions. All chassis supports (ITEM E) are symmetrically punched and may be used on either the right or left sides. Figure 4-1 shows the rack parts in their relative positions. The four channels are most easily assembled to the top and base when the channels are in a horizontal position.

TABLE 4-12

MATERIAL SUPPLIED TO ASSEMBLE RACK MT-686/GR

Item	Description	Quantity
A	Base	1 ea
B	Top	1 ea
C	Channel, Front	2 ea
D	Channel, Rear	2 ea
E	Support, Chassis	8 ea
F	Bar, Tie	4 ea
G	Lockwasher, Split, 3/8-in.	40 ea
H	Screw, Machine, Phillips-head, 5/8-in. Long	96 ea
J	Washer, Flat, No. 12	64 ea
R	Lockwasher, Split, No. 12	32 ea
S	Nut, Hex, 3/8-24	40 ea
T	Screw Cap, Hex-head, 3/8-24, 1-1/4 in.	40 ea
U	Block, Support	8 ea
V	Lug, Soldering	1 ea
W	Lockwasher, Split, 1/4-in.	1 ea
X	Nut, Hex, 1/4-20	1 ea
Y	Screw, Machine, Phillips-head, Brass, 1/4-20, 3/4-in.	1 ea



NOTES:

1- RACK IS ASSEMBLED ON ITS BACK AS SHOWN.
2- NOTCH IN REAR OF TIE BARS MUST FACE FORWARD.
3- GROUNDING LUG ITEM V, SHOULD BE PLACED UNDER ITEM Y, IN BOTTOM OF EITHER FRONT CHANNEL.

Figure 4-1. Assembly of Rack MT-686/GR

a. Place the top (ITEM B) and base (ITEM A) pieces on the floor so that by tipping them up the rack would appear to be lying on its back. The front of ITEM B is the side with the name plate while the front of ITEM A is the side adjacent to the ITEM A number.

b. Tip the bottom up and slide a front channel (ITEM C) into the corner cutout. The front of the channel is the side with pairs of holes along the entire length.

c. Insert four of the 1-1/4 inch bolts (ITEM T) through the holes at the sides of the bottom member (ITEM A) and through the mating channel holes. Then place lockwashers (ITEM G) and nuts (ITEM S) on them, with flat sides of nuts toward lockwashers. Turn nuts to within about two turns of being tight.

d. Slide the other front channel (ITEM C) into the other front corner cutout and repeat step "c."

e. Tip the top member (ITEM B) up, insert the two front channels into the corner cutouts, and bolt both channels as in step "c."

f. Slide a rear channel (ITEM D) into both a top corner cutout and its mating bottom cutout. The tapped sides of the rear channels should be toward the front of the rack.

g. Repeat steps "c"; then bolt the channel to the top in similar fashion.

h. Repeat steps "f" and "g" for the other rear channel.

i. Stand the rack up on its base. Along the front face of each front channel (ITEM C) counting up from the top edge of the base (ITEM A), identify the 1st, 9th, 24th, and 32nd pair of panel holes. Accurately scribe a mark midway between the 1st, 9th, 24th, and 32nd pair of panel holes on both front channels (ITEM C). As a check, these scribe marks should be located approximately 1-3/4 inches, 15-3/4 inches, 42 inches, and 56 inches, respectively, above the top edge of the base (ITEM A).

j. Using 5/8-inch-long screws (ITEM H) with lockwashers (ITEM R) under their heads, carefully bolt all four pairs of chassis supports (ITEM E) at the front channel so that the upper or supporting surfaces of the chassis supports are directly opposite the scribe marks. Loosely bolt the chassis supports to the rear channels.

k. Bolt two tie bars (ITEM F) across the front of the rack and two across the back, with the two notches toward the inside of the rack. Place these tie bars directly in front and in back of the chassis supports (ITEM E) and at the same level as the supports so that they cause no interference with insertion of the chassis units. The tie bars should be as equally spaced from top to bottom as the layout will permit. Each end of a tie bar is fastened in place with a 1-1/4 inch cap screw (ITEM T), a lockwasher (ITEM G), and a hex nut (ITEM S), with a support block (ITEM U) between the lockwasher and the tie bar.

NOTE

The support blocks have a rounded corner. Place this corner in the inside corner of the angles of the tie-bar end.

l. Tighten all screws, starting with those on the rear ends of the chassis supports (ITEM E), progressing to the tie bars (ITEM F), to the bottom (ITEM A), and to the top (ITEM B).

m. Secure soldering lug (ITEM V) to the outside bottom of left front channel (as viewed from front of rack) with machine screw, washer, and nut (ITEMS Y, W, AND X).

n. Do not misplace the remaining 5/8-inch-long screws and No. 12 washers (ITEMS H AND J) as they will be used later for mounting equipment in the rack.

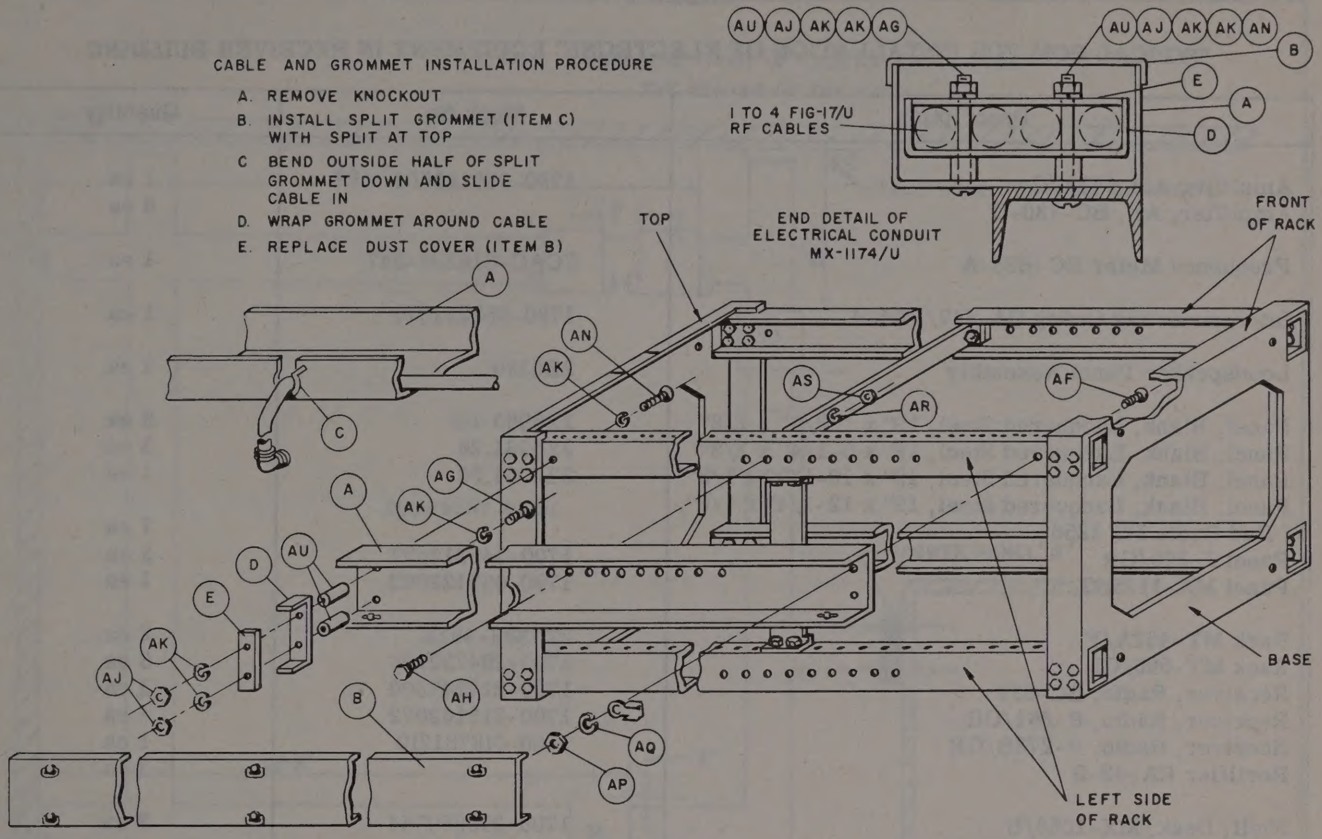
4-21. Two MT-686/GR racks are required for the receiver-site installation. Proceed to assemble the MT-686/GR racks in accordance with Paragraphs 4-19 and 4-20 above.

4-22. ATTACHING ELECTRICAL CONDUIT MX-1174/U TO RACK MT-686/GR. (Fig. 4-1 and 4-2.) Electrical Conduit MX-1174/U is auxiliary to (not a part of) Rack MT-686/GR. Where used, two of these conduits must be attached to one rack. The conduits are interchangeable right to left. Their purpose is to provide channels for cables and telephone lines. Table 4-13 lists the material supplied to attach one Electrical Conduit MX-1174/U to Rack MT-686/GR.

TABLE 4-13

MATERIAL SUPPLIED TO ATTACH ONE ELECTRICAL CONDUIT MX-1174/U TO RACK MT-686/GR

Item	Description	Quantity
A	Channel, Cable	1 ea
B	Channel Cover, Cable	1 ea
C	Grommet	10 ea
D	Clamp, Cable	1 ea
E	Clamp Support, Cable	1 ea
AF	Screw, Binder-head, Recessed, Brass, 1/4-20, 7/8-in.	1 ea
AG	Screw, Binder-head, Recessed, 1/4-24, 2-1/4 in.	1 ea
AH	Screw, Cap, 3/8-24, 1-1/2 in.	2 ea
AJ	Nut, Hex, 1/4-20	2 ea
AK	Lockwasher, Split, 1/4-in.	4 ea
AN	Screw, Binder-head, Recessed, 1/4-20, 2-1/2 in.	1 ea
AP	Nut, Hex, Brass, 1/4-20	1 ea
AQ	Lockwasher, Split, Brass, 1/4-in.	1 ea
AR	Lockwasher, Split, 3/8-in.	2 ea
AS	Nut, Hex, 3/8-24	2 ea
AU	Spacer, Tubing, Brass, 3/8, 1/2-in. Long	2 ea


CABLE AND GROMMET INSTALLATION PROCEDURE

A. REMOVE KNOCKOUT
B. INSTALL SPLIT GROMMET (ITEM C) WITH SPLIT AT TOP
C. BEND OUTSIDE HALF OF SPLIT GROMMET DOWN AND SLIDE CABLE IN
D. WRAP GROMMET AROUND CABLE
E. REPLACE DUST COVER (ITEM B)

Figure 4-2. Attaching Electrical Conduit MX-1174/U to Rack MT-686/GR

4-23. To attach Electrical Conduits MX-1174/U to Rack MT-686/GR, proceed as follows:

a. From the left side of the rack (Fig. 4-1), remove two cap screws (ITEM T) which support two tie bars (ITEM F).

b. Remove ground lug (ITEM V) from left front channel. (This step not applicable when mounting conduit MX-1174/U to right side of rack.)

c. Referring to Figure 4-2, position a cable channel (ITEM A) on the left front channel of the rack so that the series of holes along one edge is toward the front of the rack.

d. Insert machine screw (ITEM AH) through cable channel, rack channel, and tie bar, and secure by means of lockwasher (ITEM AR) and 3/8-inch nut (ITEM AS). (This machine screw replaces ITEM T of Fig. 4-1.)

e. Insert machine screw (ITEM AN) through lockwasher (ITEM AK), rack channel, cable channel (ITEM A), and brass-tubing spacer (ITEM AU), and screw into cable clamp (ITEM D) and through cable clamp support (ITEM E). The large metal grommet overhangs the rear of the rack channel.

f. Place lockwasher (ITEM AK) and hex nut (ITEM AJ) on machine screw (ITEM AN).

g. Slip lockwasher (ITEM AK) over machine screw (ITEM AG). Insert machine screw through cable channel (ITEM A) and brass-tubing spacer (ITEM AU) and screw into cable clamp (ITEM D) and through cable clamp support (ITEM E).

h. Secure by means of lockwasher (ITEM AK) and nut (ITEM AJ).

i. Attach ground lug (removed in step ''b'' above) to bottom of left front channel, using brass machine screw (ITEM AF) and brass split washer and nut (ITEMS AQ AND AP). (This step not applicable when mounting Conduit MX-1174/U to right side of rack.)

j. Attach channel cover (ITEM B) to channel by means of bail-type fasteners.

k. Do not misplace the remaining grommets (ITEM C) as they will be used later when running cables and wiring into the conduit.

l. Attach an Electrical Conduit MX-1174/U to the right side of the rack in the same manner (steps ''a'' through ''k'' above).

4-24. INSTALLATION OF ELECTRONIC EQUIPMENT IN RECEIVER BUILDING. (Fig. 4-3 through 4-6.) Table 4-14 lists the material supplied for installation of the electronic equipment in the receiver building.

TABLE 4-14

TYPICAL BOM FOR INSTALLATION OF ELECTRONIC EQUIPMENT IN RECEIVER BUILDING

Description	Stock No.	Quantity
Amplifier AM-447A/G	1790-050140501	1 ea
Amplifier, AF, BC-730-C		8 ea
Frequency Meter BC-638-A	7CAC-318208-347	1 ea
Interconnecting Group OA-447/FSA-4	1790-052261010	1 ea
Loudspeaker Panel Assembly	2Z6380	1 ea
Panel, Blank, Lacquered Steel, 19" x 1-3/4" x 1/8"	2Z6960-60	9 ea
Panel, Blank, Lacquered Steel, 19" x 5-1/4" x 1/8"	2Z6961.26	3 ea
Panel, Blank, Lacquered Steel, 19" x 10-1/2" x 1/8"	2Z6961.30	1 ea
Panel, Blank, Lacquered Steel, 19" x 12-1/4" x 1/8", Bud Radio PS-1256		7 ea
Panel J-390/GR	1700-349213697	3 ea
Panel MX-1125/G	1790-053122002	1 ea
Rack MT-453A/F	2Z7383-453A	2 ea
Rack MT-686/GR	1700-294732588	3 ea
Receiver, Radio, BC-639	1700-217247500	3 ea
Receiver, Radio, R-361/GR	1700-215162072	4 ea
Receiver, Radio, R-278B/GR	1700-018781210	1 ea
Rectifier RA-42-B		3 ea
Shelf, Desk, MX-1058/U	1700-295560744	3 ea

4-25. To install the electronic equipment in the receiver building, proceed as follows:

a. Remove all steel covers from floor trenches in the equipment room and place them on the floor along the entrance-door wall.

b. Move Interconnecting Group OA-447/FSA-4 into rack position No. 50. The position of the rack and reference dimensions are shown in Figure 4-3. Stencil the letters "RACK NO. 50" in white along the top edge of this rack.

c. Remove the top panel from rack No. 50 and mount the loudspeaker panel assembly in this space (Fig. 4-4).

d. Mount Desk Shelf MX-1430/FSA-4 in rack No. 50 (Fig. 4-4). (This desk shelf is supplied with Interconnecting Group OA-447/FSA-4.)

e. Remove the two 3-1/2 inch blank panels just below the desk shelf in rack No. 50 and mount Panel MX-1125/G in this space (Fig. 4-4).

f. Slide Amplifier AM-447A/G into Panel MX-1125/G. Secure Amplifier AM-447A/G in place by tightening LOCK screw on base of amplifier.

g. Remove all blank panels, screws, and washers from the two MT-453A/F racks. Stencil the letters "RACK NO. 31" in white along the top edge of one rack and "RACK NO. 51" along the top edge of the other rack.

h. Lay rack No. 31 on its front face. Lay out and cut a 2-in. x 3-in. rectangular hole in the top of this rack 1-1/2 inches from the back, as shown in Figure 4-5.

i. Stencil the letters "RACK NO. 1" and "RACK NO. 2" on the top front edges of the MT-686/GR racks.

j. Move rack No. 1, rack No. 2, rack No. 31, and rack No. 51 into the positions shown in Figure 4-3.

k. Mount the equipment and blank panel in rack No. 31 as shown in Figure 4-4, using No. 12-24 rack screws and No. 12 washers as supplied with each rack. Begin mounting the equipment in the bottom of the rack and progress to the top.

NOTES

1. Before installing the RA-42-B rectifiers in rack No. 31 make certain that each unit is wired for 110-volt operation. Check the SUPPLY VOLTAGE designation plate on the front panel. If the designation plate indicates 200-250 volts remove the plate and reverse it. Remove the dust cover from the unit. Remove the wire from terminal No. 1 on transformer 350 (underneath chassis) and solder it to terminal No. 8 on the transformer. (See instructions appearing on a schematic diagram found in the dust cover of the unit.) Replace the dust cover. Insert 2-amp fuses in the a-c supply fuse holders located on the front panel.

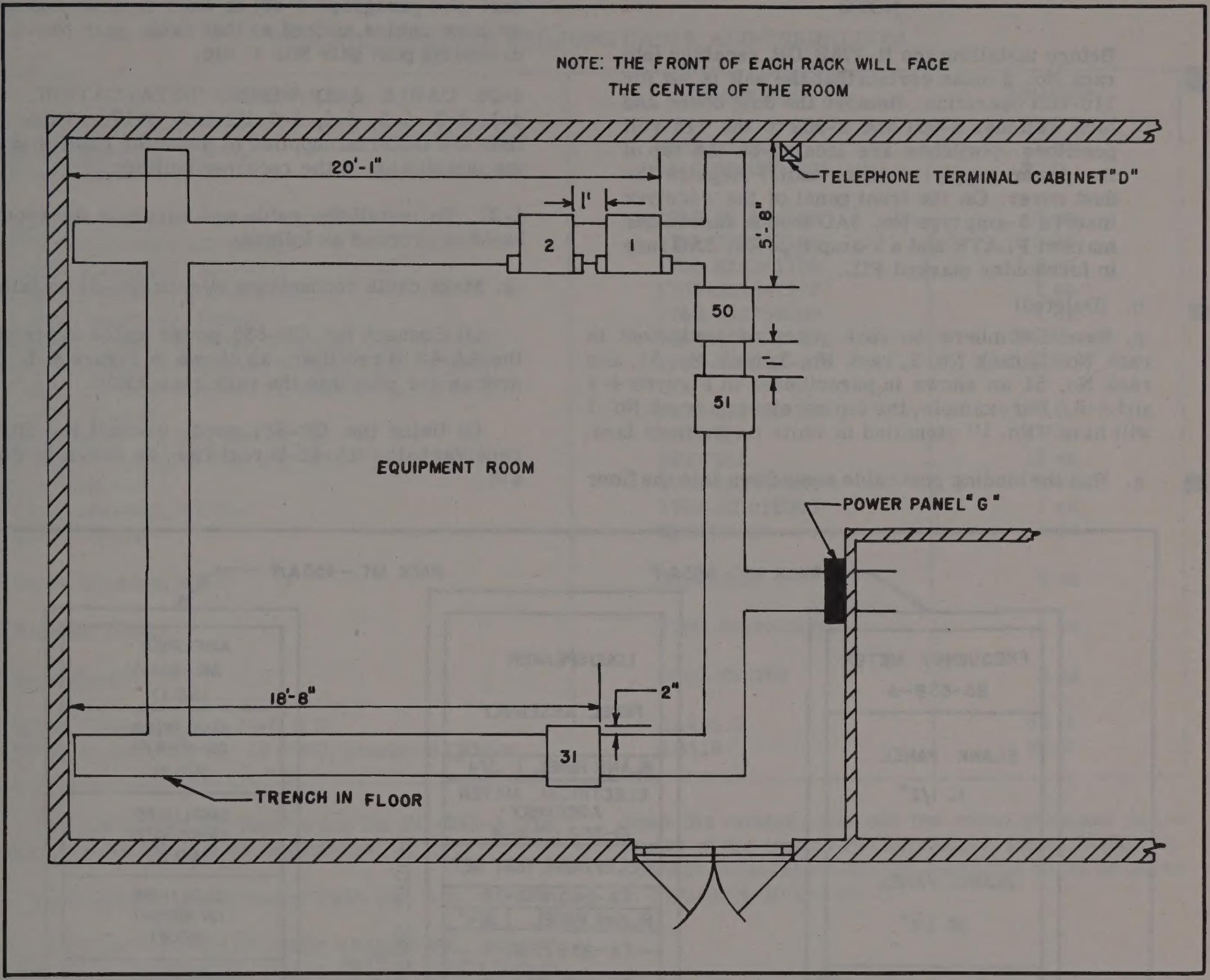

NOTE: THE FRONT OF EACH RACK WILL FACE THE CENTER OF THE ROOM
20'-1"
1'
2
1
5'-8"
TELEPHONE TERMINAL CABINET "D"
50
51
EQUIPMENT ROOM
POWER PANEL "G"
18'-8"
2"
31
TRENCH IN FLOOR

Figure 4-3. Receiver-Building Equipment Layout—Type A Building

2. Before installing the BC-638-A frequency meter in rack No. 31 change the power transformer connection for 110-volt operation. Remove the dust cover from the unit. Remove the lead from terminal No. 5 on power transformer 450, and reconnect this lead to terminal No. 2 on transformer. Replace the dust cover.

l. Mount the equipment and blank panels in rack No. 51 as shown in Figure 4-4.

NOTE

Before installing the AM-864/U amplifiers in rack No. 51 make certain that each unit is wired for 110-volt operation. Remove the dust cover from the unit. Connect the extension cord provided with the amplifier to the 0 to 110 screw terminals on the rear of the chassis. Replace dust cover.

m. Mount the equipment and blank panels in rack No. 1 as shown in Figure 4-6.

NOTE

Before installing the R-361/GR receivers into equipment racks make sure that each unit is wired for 105- to 125-volt operation. Check the supply voltage designation plate on the rear of the dust cover which indicates the line voltage for which the primary of power transformer T307 has been wired. If the designation plate indicates 210- to 250-volts, remove the plate and reverse it. Stand the receiver on its front panel handles and remove the dust cover. Remove jumper on T307 between terminals 2 and 3. Connect jumpers between 1 and 2, 3 and 4. Replace the dust cover.

n. Mount the equipment and blank panels in rack No. 2 as shown in Figure 4-6.

NOTE

Before installing the R-278B/GR receiver into rack No. 2 make certain that the unit is set for 115-volt operation. Remove the dust cover and turn switches S-901 and S-902 to the 115-volt positions. (Switches are located on the top of the power supply rectifier unit.) Replace the dust cover. On the front panel of the receiver insert a 3-amp type No. 3AG fuse in fuseholder marked PLATE and a 5-amp type No. 3AG fuse in fuseholder marked FIL.

o. (Deleted)

p. Stencil numbers on each piece of equipment in rack No. 1, rack No. 2, rack No. 3, rack No. 31, and rack No. 51 as shown in parentheses in Figures 4-4 and 4-6. For example, the top receiver in rack No. 1 will have "No. 1" stenciled in white on its front face.

q. Run the binding post cable studs down into the floor duct (See paragraph 3-68) at each location and splice or have cables spliced so that cable pair No. 1 goes to binding post pair No. 1 etc.

4-26. CABLE AND WIRING INSTALLATION. (Fig. 4-1, 4-2, 4-3, 4-4, 4-6 through 4-17.) Table 4-15 lists the material supplied to make the cable and wiring installation in the receiver building.

4-27. To install the cable and wiring in the receiver building proceed as follows:

a. Make cable connections in rack No. 31 as follows:

(1) Connect the CD-833 power-cable assembly to the RA-42-B rectifier, as shown in Figure 4-7. Connect an a-c plug into the rack receptacle.

(2) Using the CD-881 cord, connect the BC-639 receiver to the RA-42-B rectifier, as shown in Figure 4-7.

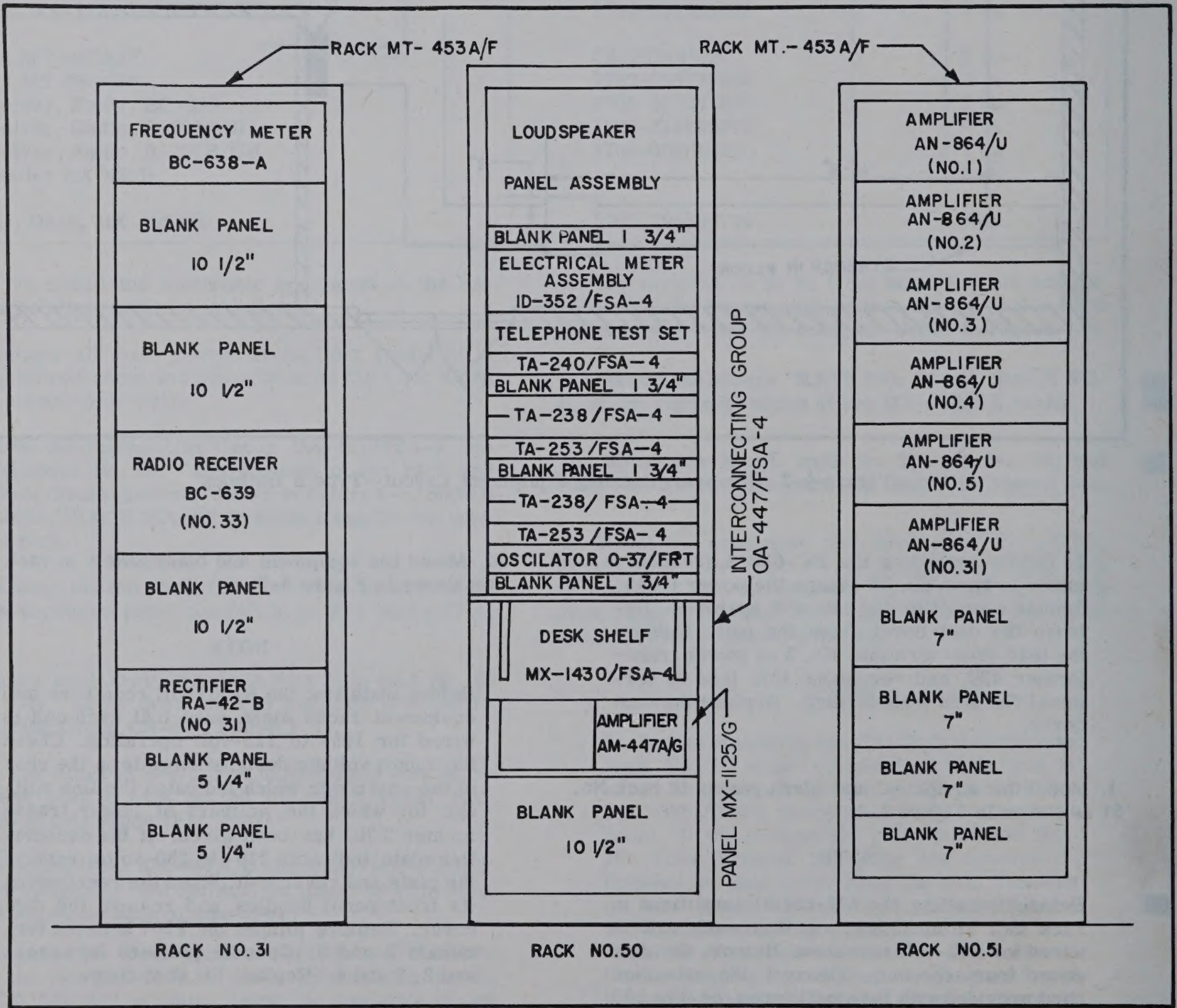

RACK MT- 453A/F
RACK MT.- 453 A/F
FREQUENCY METER BC-638-A
BLANK PANEL 10 1/2"
BLANK PANEL 10 1/2"
RADIO RECEIVER BC-639 (NO. 33)
BLANK PANEL 10 1/2"
RECTIFIER RA-42-B (NO 31)
BLANK PANEL 5 1/4"
BLANK PANEL 5 1/4"
LOUDSPEAKER PANEL ASSEMBLY
BLANK PANEL 1 3/4"
ELECTRICAL METER ASSEMBLY ID-352 /FSA-4
TELEPHONE TEST SET
TA-240/FSA-4
BLANK PANEL 1 3/4"
TA-238/FSA-4
TA-253 /FSA-4
BLANK PANEL 1 3/4"
TA-238/ FSA-4
TA-253 /FSA-4
OSCILATOR 0-37/FRT
BLANK PANEL 1 3/4"
DESK SHELF MX-1430/FSA-4
AMPLIFIER AM-447A/G
BLANK PANEL 10 1/2"
INTERCONNECTING GROUP OA-447/FSA-4
PANEL MX-1125/G
AMPLIFIER AN-864/U (NO.1)
AMPLIFIER AN-864/U (NO.2)
AMPLIFIER AN-864/U (NO.3)
AMPLIFIER AN-864/U (NO.4)
AMPLIFIER AN-864/U (NO.5)
AMPLIFIER AN-864/U (NO.31)
BLANK PANEL 7"
BLANK PANEL 7"
BLANK PANEL 7"
BLANK PANEL 7"
RACK NO. 31
RACK NO.50
RACK NO.51

Figure 4-4. Equipment Layout—Racks No. 31, No. 50, and No. 51

TABLE 4-15

TYPICAL RECEIVER BUILDING CABLE AND WIRING BOM

Description	Stock No.	Quantity
Box Connector, 1/2-in.	8800-038200	2 ea
Braid, Wire, 1/2-in.	8860-050000-825	30 ft
Cable Assembly, Power, CD-883	1700-321914560	3 ea
Cable Assembly CX-1541/U	1700-322847600	5 ea
Cable Assembly CG-707/U	1700-322981799	5 ea
Cable Assembly CX-1540/U	1700-322847550	1 ea
Cable Assembly, Power	1760-322758000	1 ea
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	200 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	500 ft
Cable, Special-Purpose, 2-Cond., No. 22 AWG (Red, Black)	8860-398000-211	100 ft
Cord, W.E. Co. No. 3P7D, 2 ft	3E3P7D	12 ea
Cord, W.E. Co. No. 3P15A, 6 ft	3E3P15A	12 ea
Cord CD-881	1700-321914280	3 ea
Cord, Headset, CD-307	1790-321018000	1 ea
Cord, Headset	3E3162-42	1 ea
Fuze, 15-Amp, 125V	3Z2615.3	2 ea
Headset HS-33	1790-207600000	1 ea
Receptacle	8850-495790	2 ea
Wire, Copper, No. 6 AWG S.D.	1A806.9	50 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	50 ft

(3) Connect the a-c line cord of the BC-638-A frequency meter into a rack receptacle.

b. Make cable connections in rack No. 1 as follows:

(1) Using CX-1541/U cable assemblies, connect R-361/GR receivers to the J-390/GR distribution panel, as shown in Figures 4-6, 4-8, and 4-9.

(2) Connect one each of Cable Assembly CG-707/U to each R-361/GR receiver (Fig. 4-6 and 4-8). Leave the unattached cable ends hanging loose from the receivers.

c. (Deleted)

(1) and (2) (Deleted)

d. Make cable connections in rack No. 2 as follows:

(1) Remove cover from Electrical Conduit MX-1174/U located on right side of rack (Fig. 4-6). On the front of this conduit knock out one of the 1-1/2 inch knockouts that is located near the lower edge of R-278B/GR receiver No. 5, and install a split grommet as shown in Figure 4-2.

(2) Connect Cable Assembly CX-1540/U, a Cable Assembly CX-1541/U, and a Cable Assembly CG-707/U to R-278/GR receiver No. 5 (Fig. 4-10).

(3) Thread Cable Assembly CX-1540/U and CX-1541/U through the 1-1/2 inch conduit knockout hole, down the conduit, and out the metal grommet in the center of the conduit to Distribution Panel J-390/GR. Connect these cables into the J-390/GR panel as shown in Figures 4-10 and 4-11.

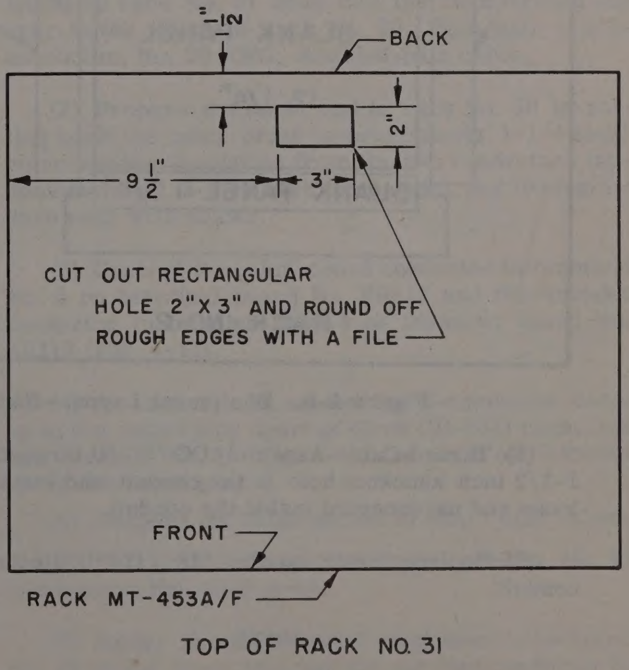

1/2"
BACK
2"
9 1/2"
3"
CUT OUT RECTANGULAR HOLE 2"X 3" AND ROUND OFF ROUGH EDGES WITH A FILE
FRONT
RACK MT-453A/F
TOP OF RACK NO. 31

Figure 4-5. Cutout Detail—Rack No. 31

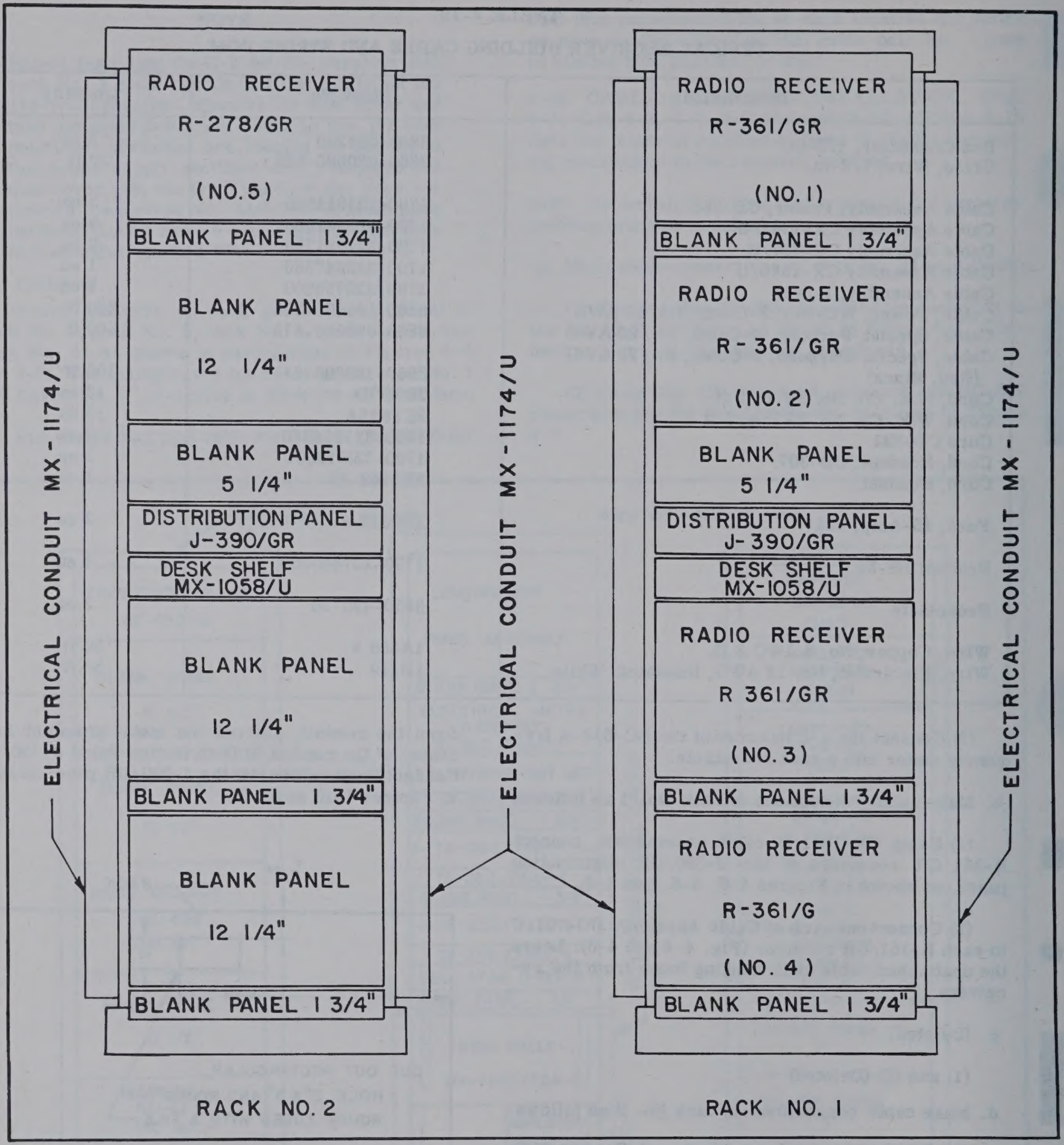

RADIO RECEIVER
R-278/GR
(NO.5)
BLANK PANEL 1 3/4"
BLANK PANEL
12 1/4"
BLANK PANEL
5 1/4"
DISTRIBUTION PANEL
J-390/GR
DESK SHELF
MX-1058/U
BLANK PANEL
12 1/4"
BLANK PANEL 1 3/4"
BLANK PANEL
12 1/4"
BLANK PANEL 1 3/4"
ELECTRICAL CONDUIT MX-1174/U
ELECTRICAL CONDUIT MX-1174/U
RADIO RECEIVER
R-361/GR
(NO.1)
BLANK PANEL 1 3/4"
RADIO RECEIVER
R-361/GR
(NO. 2)
BLANK PANEL
5 1/4"
DISTRIBUTION PANEL
J-390/GR
DESK SHELF
MX-1058/U
RADIO RECEIVER
R 361/GR
(NO. 3)
BLANK PANEL 1 3/4"
RADIO RECEIVER
R-361/G
(NO. 4)
BLANK PANEL 1 3/4"
ELECTRICAL CONDUIT MX-1174/U
RACK NO. 2
RACK NO. 1

Figure 4-6. Equipment Layout—Racks No. 1 and No. 2 (As Positioned at Remote Site)

(4) Thread Cable Assembly CG-707/U through the 1-1/2 inch knockout hole in the conduit and leave the loose end unconnected inside the conduit.

(5) Replace cover on the MX-1174/U electrical conduit.

NOTE

In steps "e," "f," "h," "i," and "j" below, make certain that the color-coded conductor of each cable pair is connected to the odd-numbered terminals and the uncoded conductor to the even-numbered terminals. Arrange all cable runs neatly inside the racks and along the floors of the cable trenches.

e. Study Table 4-16 and Figures 4-4, 4-12, and 4-13. Then connect audio wiring between rack No. 31 and rack No. 50 as follows:

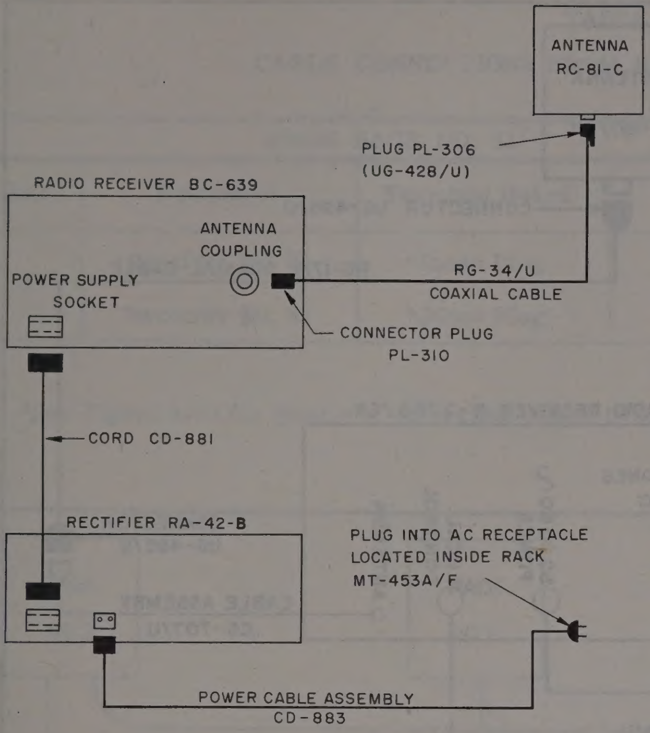

ANTENNA
RC-81-C
PLUG PL-306
(UG-428/U)
RADIO RECEIVER BC-639
ANTENNA
COUPLING
POWER SUPPLY
SOCKET
RG-34/U
COAXIAL CABLE
CONNECTOR PLUG
PL-310
CORD CD-881
RECTIFIER RA-42-B
PLUG INTO AC RECEPTACLE
LOCATED INSIDE RACK
MT-453A/F
POWER CABLE ASSEMBLY
CD-883

Figure 4-7. Cable Connections for Radio Receiver BC-639

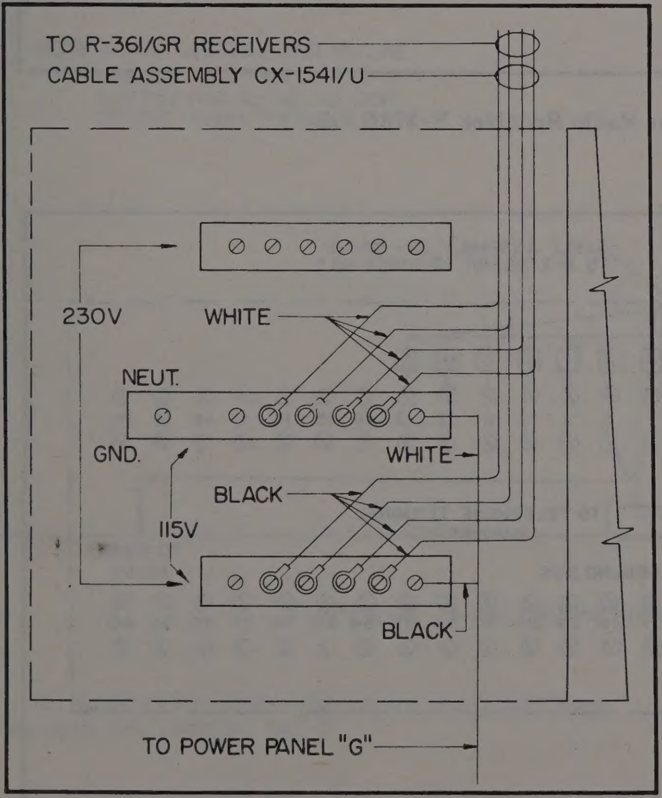

TO R-361/GR RECEIVERS
CABLE ASSEMBLY CX-1541/U
230V
WHITE
NEUT.
GND.
WHITE
BLACK
115V
BLACK
TO POWER PANEL "G"

Figure 4-9. Cable Connections to Distribution Panel J-390/GR in Rack No. 1 and Rack No. 2

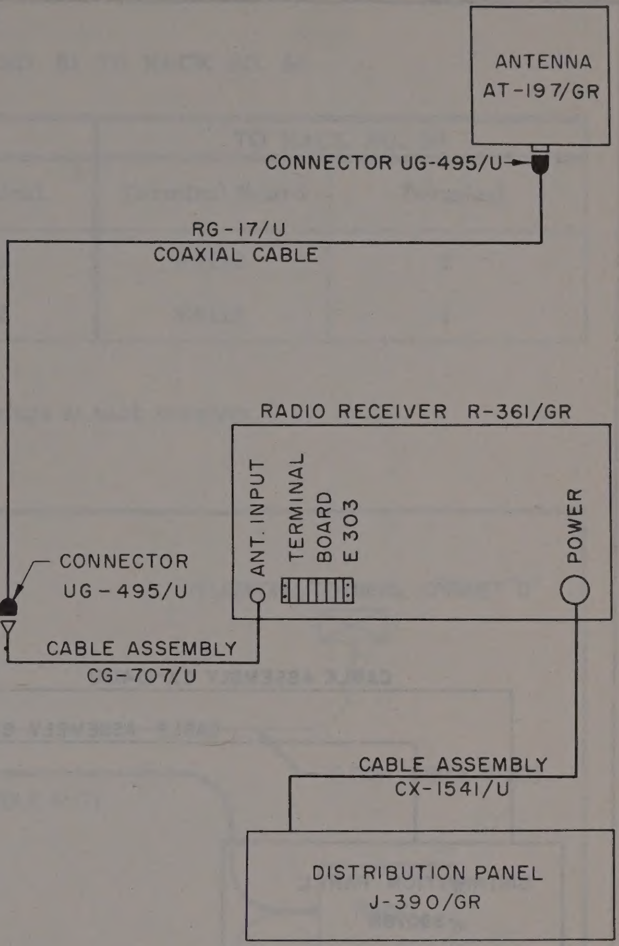

ANTENNA
AT-197/GR
CONNECTOR UG-495/U
RG-17/U
COAXIAL CABLE
RADIO RECEIVER R-361/GR
ANT. INPUT
TERMINAL
BOARD
E 303
POWER
CONNECTOR
UG-495/U
CABLE ASSEMBLY
CG-707/U
CABLE ASSEMBLY
CX-1541/U
DISTRIBUTION PANEL
J-390/GR

Figure 4-8. Cable Connections for Radio Receiver R-361/GR

(1) Run cable pair No. 1 (Table 4-16) from the inside of rack No. 31 down into the floor trench and over to the inside of rack No. 50. This pair is a 2-conductor, No. 20 AWG, shielded-pair cable.

(2) Prepare the cable end in rack No. 50 by cutting back the outer braid (approximately 1-1/4 inch), removing the insulation from the two conductors (approximately 1/2-inch back from ends), and tinning the bare ends with solder.

(3) Connect the color-coded conductor to terminal No. 3 on terminal board No. E6112 and the uncoded conductor to terminal No. 4 on terminal board No. E6112 (Fig. 4-13).

(4) At rack No. 31 extend the 2-conductor cable up to the Jones plug (part of Cord CD-881) connected into receiver No. 31 (Fig. 4-4), and cut it off 2 inches above the Jones plug.

(5) Prepare the cable end as in step "e(2)" above.

(6) Pull out the Jones plug from receiver No. 31 and remove the outer cover.

(7) Solder the color-coded conductor to terminal No. 11 on the Jones plug and the uncoded conductor to terminal No. 12 as shown in Figure 4-14.

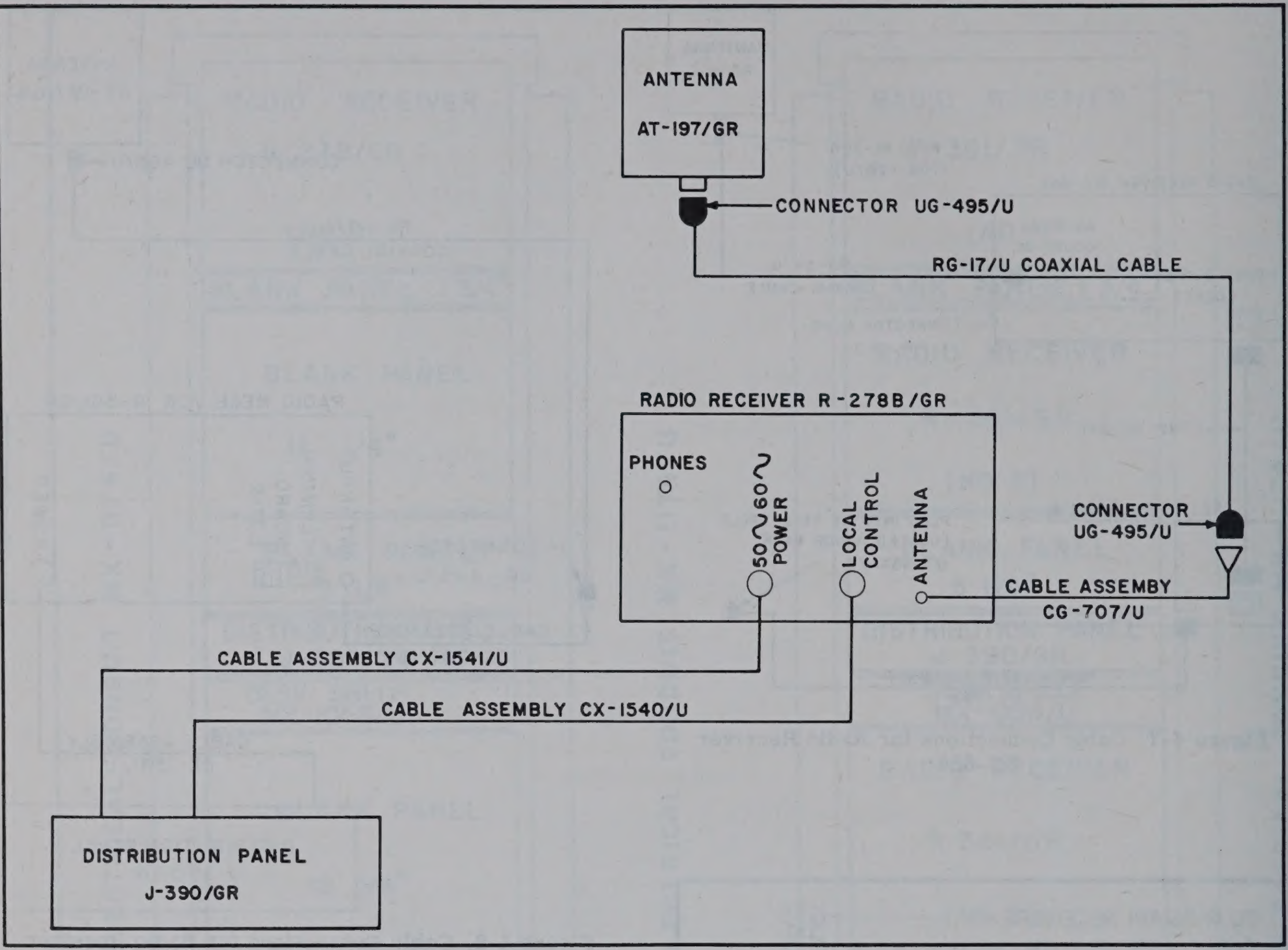

ANTENNA
AT-197/GR
CONNECTOR UG-495/U
RG-17/U COAXIAL CABLE
RADIO RECEIVER R-278B/GR
PHONES
50∿60∿ POWER
LOCAL CONTROL
ANTENNA
CONNECTOR UG-495/U
CABLE ASSEMBY CG-707/U
CABLE ASSEMBLY CX-1541/U
CABLE ASSEMBLY CX-1540/U
DISTRIBUTION PANEL
J-390/GR

Figure 4-10. Cable Connections for Radio Receiver R-278B/GR

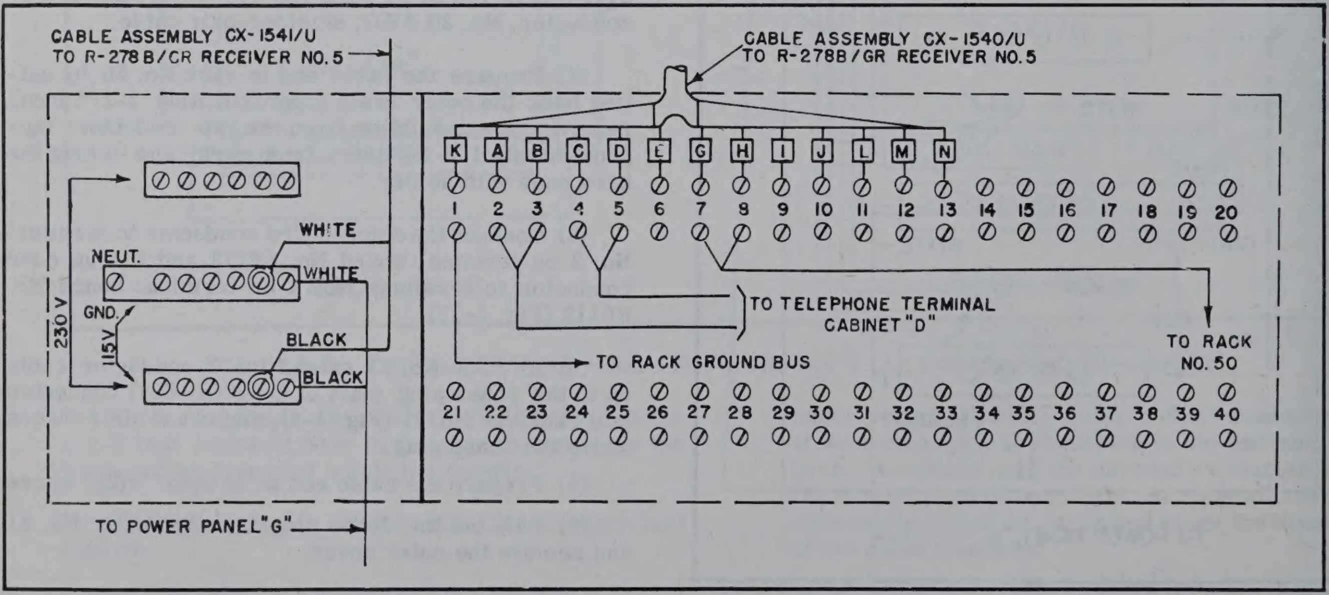

CABLE ASSEMBLY CX-1541/U TO R-278B/GR RECEIVER NO.5
CABLE ASSEMBLY CX-1540/U TO R-278B/GR RECEIVER NO.5
K A B C D E G H I J L M N
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
WHITE
NEUT.
WHITE
GND.
230 V
115V
BLACK
BLACK
TO TELEPHONE TERMINAL CABINET "D"
TO RACK GROUND BUS
TO RACK NO. 50
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
TO POWER PANEL "G"

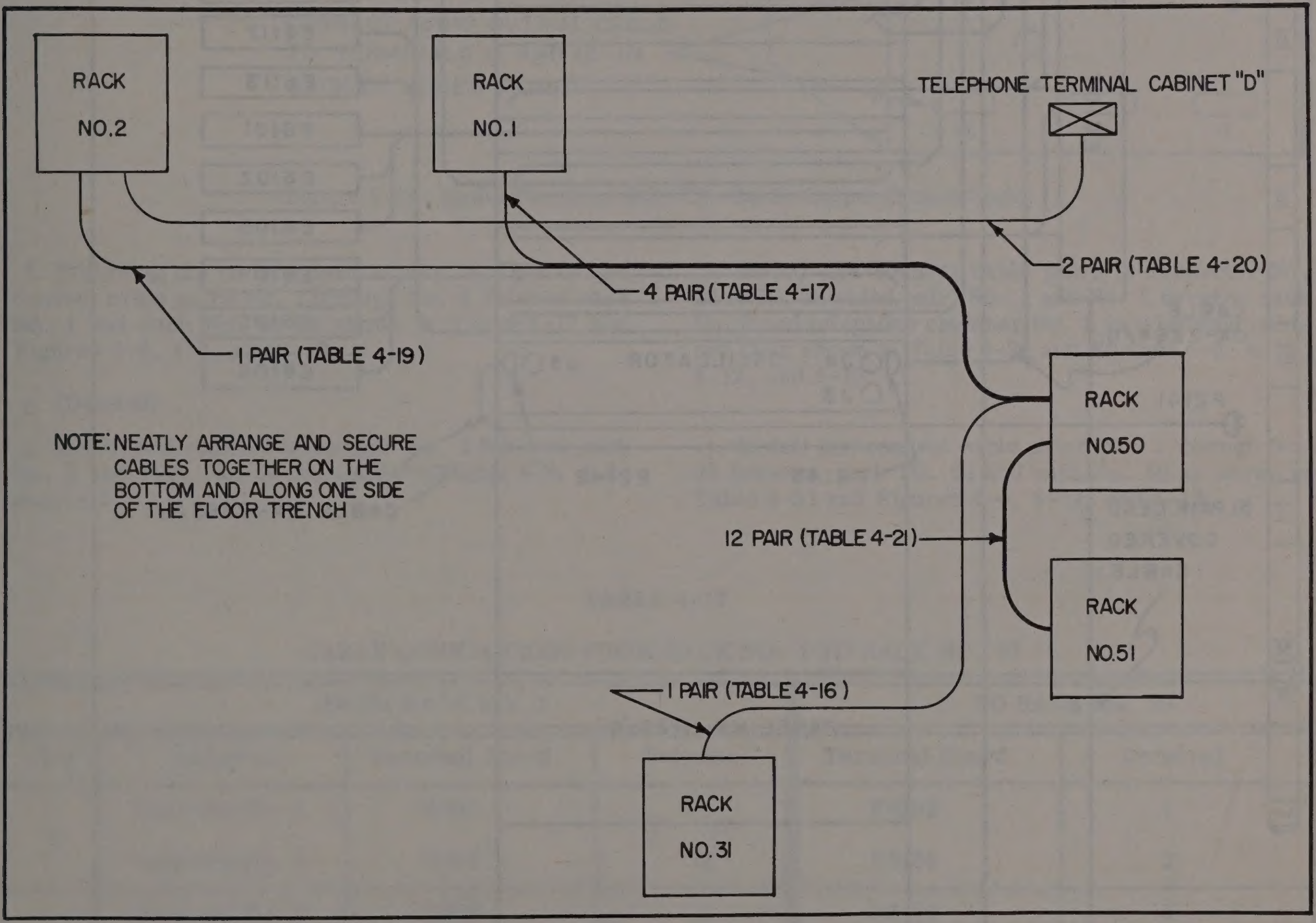
Figure 4-11. Cable Connections to Distribution Panel J-390/GR in Rack No. 3

TABLE 4-16

CABLE CONNECTIONS FROM RACK NO. 31 TO RACK NO. 50

FROM RACK NO. 31				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Receiver No. 31	*Jones Plug	11	E6112	3
	Receiver No. 31	*Jones Plug	12	E6112	4

*See Figure 4-14 for details of connecting cables to Jones plugs at each receiver.


RACK NO.2
RACK NO.1
TELEPHONE TERMINAL CABINET "D"
2 PAIR (TABLE 4-20)
4 PAIR (TABLE 4-17)
1 PAIR (TABLE 4-19)
RACK NO.50
12 PAIR (TABLE 4-21)
RACK NO.51
1 PAIR (TABLE 4-16)
RACK NO. 31

NOTE: NEATLY ARRANGE AND SECURE CABLES TOGETHER ON THE BOTTOM AND ALONG ONE SIDE OF THE FLOOR TRENCH

Figure 4-12. Audio Cabling Between Racks in Receiver Building

(8) Replace the Jones plug cover and insert Jones plug back into receiver No. 31.

(9) (Deleted)

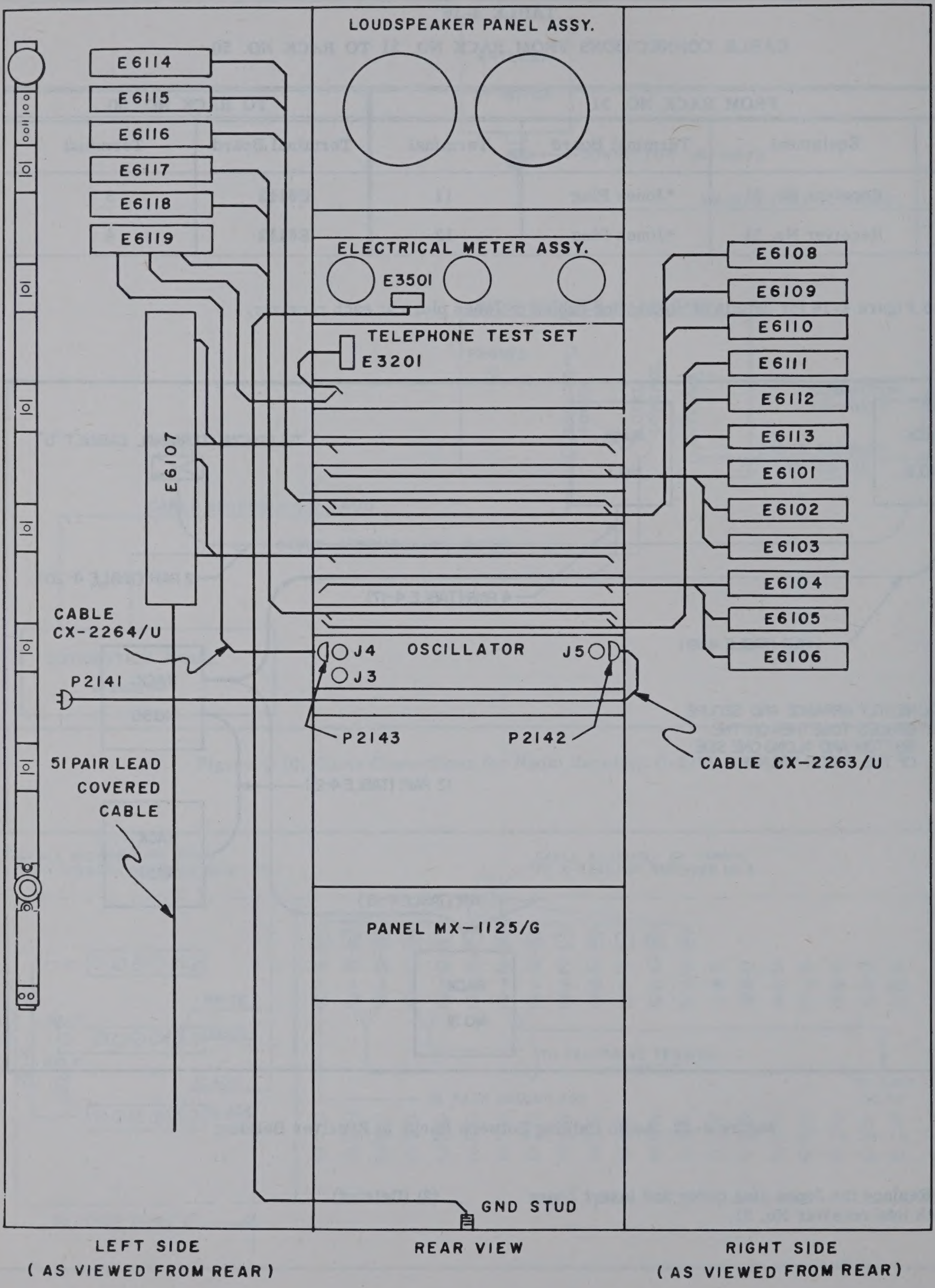

LOUDSPEAKER PANEL ASSY.
E6114
E6115
E6116
E6117
E6118
E6119
ELECTRICAL METER ASSY.
E3501
TELEPHONE TEST SET
E3201
E6107
E6108
E6109
E6110
E6111
E6112
E6113
E6101
E6102
E6103
E6104
E6105
E6106
CABLE CX-2264/U
P2141
J4
J3
OSCILLATOR
J5
P2143
P2142
CABLE CX-2263/U
51 PAIR LEAD COVERED CABLE
PANEL MX-1125/G
GND STUD
LEFT SIDE (AS VIEWED FROM REAR)
REAR VIEW
RIGHT SIDE (AS VIEWED FROM REAR)

Figure 4-13. Interconnecting Group OA-447/FSA-4, Rear View

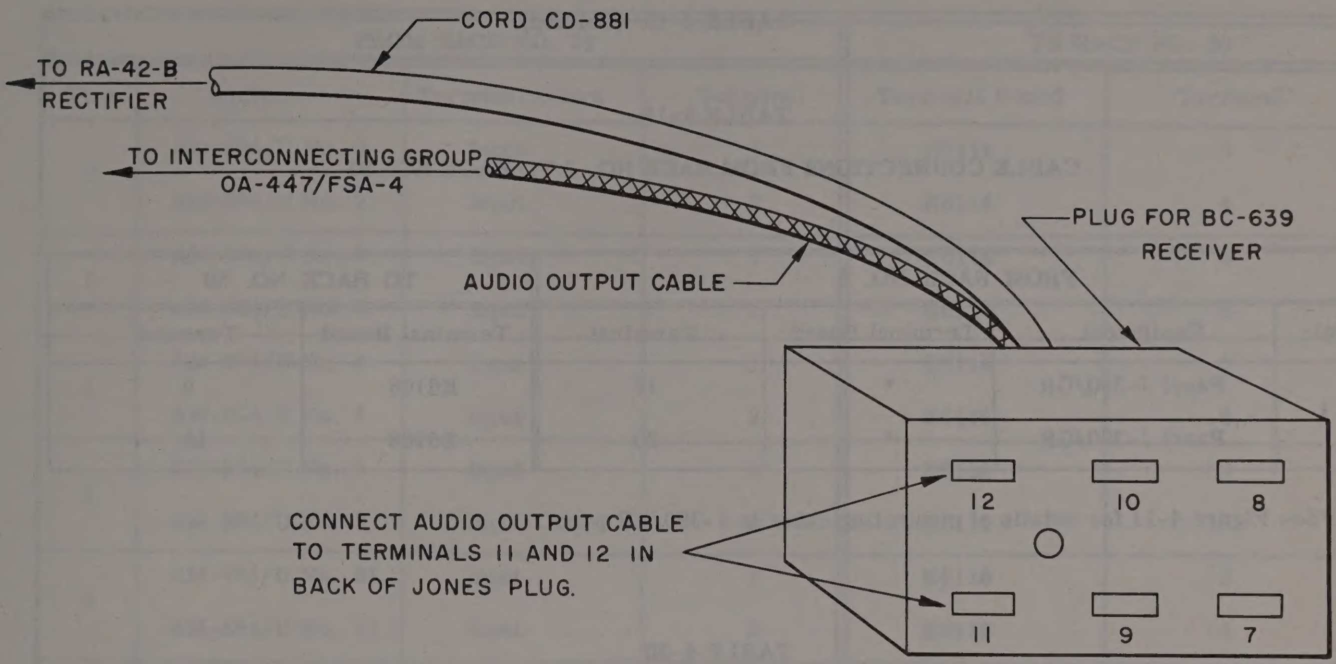

CORD CD-881
TO RA-42-B RECTIFIER
TO INTERCONNECTING GROUP OA-447/FSA-4
PLUG FOR BC-639 RECEIVER
AUDIO OUTPUT CABLE
CONNECT AUDIO OUTPUT CABLE TO TERMINALS 11 AND 12 IN BACK OF JONES PLUG.
12
10
8
11
9
7

Figure 4-14. Radio Receiver BC-639—Audio Output Connections

f. Following the method used in step "e," install and connect cable pairs No. 1 through No. 4 between rack No. 1 and rack No. 50 as shown in Table 4-17 and Figures 4-6, 4-8, and 4-13.

g. (Deleted)

h. Install and connect cable pair No. 1 between rack No. 2 and rack No. 50 as shown in Table 4-6, 4-8, and 4-13.

i. Install and connect cable pairs (2-conductor No. 20 AWG, shielded pair) No. 1 and No. 2 between rack No. 2 and telephone chamber No. 2 in telephone cabinet D as shown in Table 4-20 and Figures 4-3, 4-11, 4-12, and 4-15.

j. Install and connect cable pairs No. 1 through No. 12 between rack No. 51 and rack No. 50 as shown in Table 4-21 and Figures 4-4, 4-12, and 4-13.

TABLE 4-17

CABLE CONNECTIONS FROM RACK NO. 1 TO RACK NO. 50

FROM RACK NO. 1				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Receiver No. 1	E303	1	E6108	1
	Receiver No. 1	E303	2	E6108	2
2	Receiver No. 2	E303	1	E6108	3
	Receiver No. 2	E303	2	E6108	4
3	Receiver No. 3	E303	3	E6108	5
	Receiver No. 3	E303	4	E6108	6
4	Receiver No. 4	E303	3	E6108	7
	Receiver No. 4	E303	4	E6108	8

TABLE 4-18 (Deleted)

TABLE 4-19

CABLE CONNECTIONS FROM RACK NO. 2 TO RACK NO. 50

FROM RACK NO. 2				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Panel J-390/GR	*	19	E6108	9
	Panel J-390/GR	*	20	E6108	10

*See Figure 4-11 for details of connecting cable to J-390/GR panel.

TABLE 4-20

CABLE CONNECTIONS FROM RACK NO. 2 TO TELEPHONE CHAMBER NO. 2 IN CABINET D

FROM RACK NO. 2				TO TELEPHONE CHAMBER NO. 2	
Pair	Equipment	Terminal Board	Terminal	Terminal Pair No.	Terminal Post
1	Panel J-390/GR	*	2	62	Left
	Panel J-390/GR	*	3	62	Right
2	Panel J-390/GR	*	4	87	Left
	Panel J-390/GR	*	5	87	Right

*See Figure 4-11 for details of connecting cables to J-390/GR panel.

TABLE 4-21

CABLE CONNECTIONS FROM RACK NO. 51 TO RACK NO. 50

FROM RACK NO. 51				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	AM-864/U No. 1	Input	1	E6114	1
	AM-864/U No. 1	Input	2	E6114	2

TABLE 4-21—Continued

FROM RACK NO. 51				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
2	AM-864/U No. 2	Input	1	E6114	3
	AM-864/U No. 2	Input	2	E6114	4
3	AM-864/U No. 3	Input	1	E6114	5
	AM-864/U No. 3	Input	2	E6114	6
4	AM-864/U No. 4	Input	1	E6114	7
	AM-864/U No. 4	Input	2	E6114	8
5	AM-864/U No. 5	Input	1	E6114	9
	AM-864/U No. 5	Input	2	E6114	10
6	AM-864/U No. 31	Input	1	E6118	3
	AM-864/U No. 31	Input	2	E6118	4
9	AM-864/U No. 1	Output	1	E6101	1
	AM-864/U No. 1	Output	2	E6101	2
10	AM-864/U No. 2	Output	1	E6101	3
	AM-864/U No. 2	Output	2	E6101	4
11	AM-864/U No. 3	Output	1	E6101	5
	AM-864/U No. 3	Output	2	E6101	6
12	AM-864/U No. 4	Output	1	E6101	7
	AM-864/U No. 4	Output	2	E6101	8
13	AM-864/U No. 5	Output	1	E6101	9
	AM-864/U No. 5	Output	2	E6101	10
14	AM-864/U No. 31	Output	1	E6105	3
	AM-864/U No. 31	Output	2	E6105	4

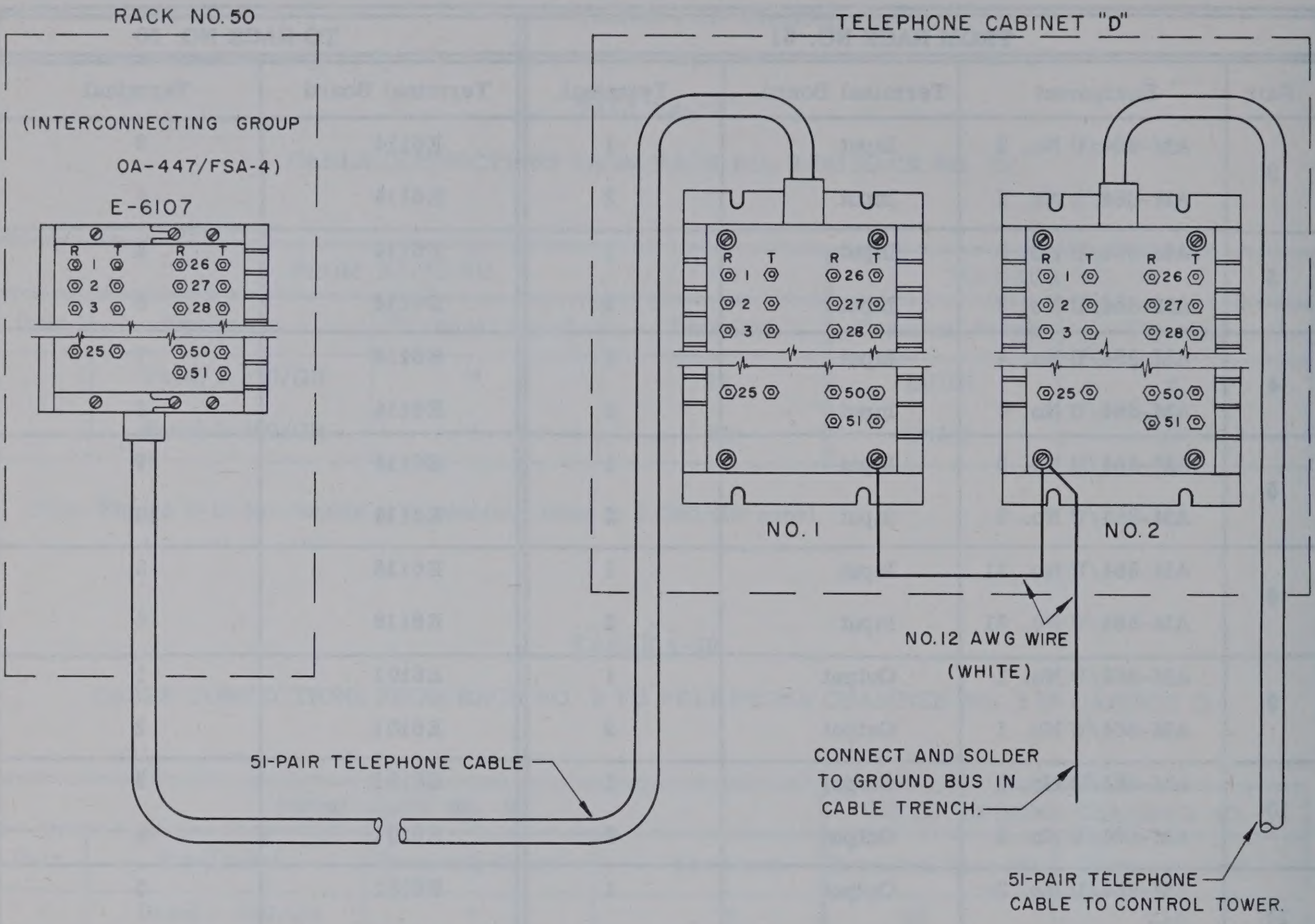

RACK NO. 50
(INTERCONNECTING GROUP
OA-447/FSA-4)
E-6107
R T R T
1 26
2 27
3 28
25 50
51
TELEPHONE CABINET "D"
NO. 1
NO. 2
NO. 12 AWG WIRE
(WHITE)
CONNECT AND SOLDER
TO GROUND BUS IN
CABLE TRENCH.
51-PAIR TELEPHONE CABLE
51-PAIR TELEPHONE
CABLE TO CONTROL TOWER.

Figure 4-15. Telephone Terminal Chambers in Receiver Building

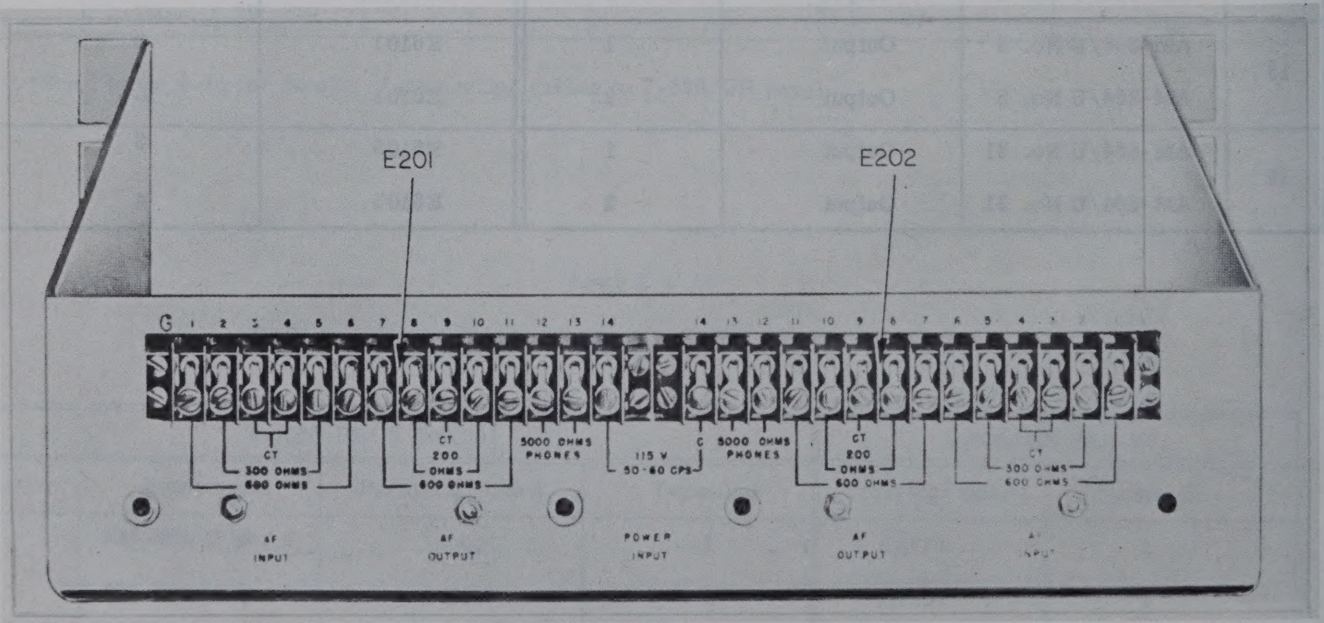

E201
E202
G
CT
300 OHMS
600 OHMS
CT
200
OHMS
600 OHMS
5000 OHMS
PHONES
115 V
50-60 CPS
C
5000 OHMS
PHONES
CT
200
OHMS
600 OHMS
CT
300 OHMS
600 OHMS
AF
INPUT
AF
OUTPUT
POWER
INPUT
AF
OUTPUT
AF
INPUT

Figure 4-16. Mounting Panel MX-1125/G, Rear View

TABLE 4-22

INTERNAL CABLE CONNECTIONS IN RACK NO. 50

- FROM -			- TO -		
Pair	Terminal Board	Terminal	Equipment	Terminal Board	Terminal
1	E6110	13	Left Speaker	Input	1
	E6110	14	Left Speaker	Input	2
2	E6110	15	Right Speaker	Input	1
	E6110	16	Right Speaker	Input	2
3	E6116	11	Panel MX-1125/G	*E201	1
	E6116	12	Panel MX-1125/G	*E201	6
4	E6116	13	Panel MX-1125/G	*E201	7
	E6116	14	Panel MX-1125/G	*E201	11

*See Figure 4-16 for location of E201 on Panel MX-1125/G. (Strap terminals 3 and 4 together for center-tap.)

k. Neatly form and lace together with lacing twine all cables installed in steps "e," "f," "g," "h," "i," and "j" above, as shown in Figure 4-12. The laced cables must lie on one side of the cable-trench floor and be neatly mounted to the insides of racks by means of existing clamps, cable rings, or lacing twine.

l. Install and connect cable pairs No. 1 through No. 4 between equipment and terminal boards in rack No. 50 (Interconnecting Group OA-447/FSA-4) as shown in Table 4-22 and Figures 4-4, 4-13, and 4-16.

m. Make cable connections in rack No. 50 as follows:

(1) Connect Cable Assembly CX-2264/U (part of OA-447/FSA-4) into the rear of Oscillator OA-37/FRT, as shown in Figure 4-13.

(2) Connect Cable Assembly CX-2263/U (part of OA-447/FSA-4) into the oscillator and a rack receptacle, as shown in Figure 4-13.

(3) Connect the wires of the power-cable assembly (Table 4-15) to the two terminals No. 14 (115V, 50/60 cps) on Mounting Panel MX-1125/G (Fig. 4-16), and insert the plug on the other end of this cable assembly into an a-c receptacle on the side of the rack.

n. Bundle shielded audio cables together, secure with braid and ground shields by soldering to the ground bus in the cable trench under rack Nos. 1, 2, 31, 50, and 51. Care should be taken during this step to assure that audio cable insulation is not damaged by excessive heating.

o. At rack No. 50 cut a length of No. 6 AWG bare copper wire, and fasten it to the ground stud shown in Figure 4-13. Run the wire through the bottom of the rack, and solder it to the ground bus in the cable trench.

p. At racks No. 31 and No. 51 cut a length of No. 6 AWG bare copper wire, and solder one end to the rack ground bus. Run the wire through the bottom of the rack, and solder the other end to the ground bus in the cable trench.

q. At rack No. 1 install a ground bus, and ground the equipment as follows:

(1) Loosen a nut (ITEM S of Fig. 4-1) at the top and bottom of the left rear channel (ITEM D).

(2) Cut an 8-foot length of No. 6 AWG bare copper wire and attach one end under the top nut (ITEM S) on the inside of the left rear channel. Tighten nut down firmly on the wire.

(3) Bend the wire out approximately 1 inch from the nut so that it will not lie on the flat face of the channel.

(4) Run the wire down the inside of the rear channel, keeping it approximately 1 inch out from the flat face of the channel. Run it under the lower nut (ITEM S) and into the cable trench.

(5) Neatly arrange and form the wire inside the channel. Then tighten the lower nut down firmly on the wire.

(6) Solder the loose end of the wire to the ground bus in the cable trench.

(7) Cut a length of No. 12 AWG, white, insulated wire, remove insulation from one end, and connect to GND terminal of R-361/GR receiver No. 1. Remove insulation from the other end, and solder to the No. 6 AWG ground bus that was installed on the rack in steps "q(1)" through "q(6)" above.

(8) In a similar manner, ground R-361/GR receivers Nos. 2, 3, and 4 to the ground bus on the rack.

r. (Deleted)

s. At rack No. 2 install a ground bus, and ground the equipment as follows:

(1) Install a No. 6 AWG ground bus in rack No. 2 in accordance with steps "q(1)" through "q(6)."

(2) Connect a No. 12 AWG or larger, 2-conductor cable into the switch box by means of a 1/2-inch box connector.

WARNING

Be sure the main line power switch in the generator room is open before working at power distribution panel G.

t. Stencil the letters "PANEL G" in white on the power distribution panel that is located over the floor trench in the equipment room (Fig. 4-3). Remove the front cover of this panel and turn all circuit breakers to OFF.

u. Connect rack No. 31 into power distribution panel G as follows (Table 4-23):

TABLE 4-23

EQUIPMENT SCHEDULE FOR RECEIVER-BUILDING POWER PANEL

PANEL G	
CIRCUIT BREAKER (20-AMP)	EQUIPMENT
1	Rack No. 1
2	Rack No. 2
3	
4	Rack No. 50
5	Rack No. 51
6	Rack No. 31
7	Spare
8	Spare
9	Spare
10	Spare
11	Spare
12	Spare
13	Spare
14	Spare
15	Spare
16	Spare
17	Spare (240V or 208V)
18	Spare (240V or 208V)

(1) Remove a knockout in the base of the switch box in rack No. 31.

(2) Connect a No. 10 AWG, 2-conductor cable into the switch box by means of a 1/2-inch box connector.

(3) Connect the white wire of this cable to neutral terminal (the terminal which connects to the white wire from the rack receptacles).

(4) Connect the black wire of the cable to the other switch terminal. Screw a 15-amp plug fuse into the fuse holder connected to the black wires.

NOTE

If both legs of the switch are fused, connect a No. 12 AWG white-insulated jumper across the fuse holder connected to the white wires.

(5) Run the No. 12 AWG or larger cable down through the bottom of the rack into the cable trench and over to panel G. Then pass cable through a conduit from the floor trench to the inside of panel G.

(6) Connect the white wire of this cable to the neutral (ground bus) in panel G.

(7) Connect the black wire to the terminal on circuit breaker No. 6.

(8) Print "RACK NO. 31" on the door of panel G to identify circuit breaker No. 6.

v. Using the method described in step "u" connect rack No. 51 to circuit breaker No. 5 of panel G. Connect the a-c line cords of the six AM-864/U amplifiers into the rack outlets.

w. Connect rack No. 50 into power panel G as follows:

(1) Connect a No. 12 AWG or larger, 2-conductor cable into the rack outlet strip by connecting the white wires together and the black wires together. Wrap the splices with insulating tape.

(2) Fasten the cable to the outlet strip with the squeeze connector on the strip.

(3) Run the cable through the cable trench to panel G. Connect the white wire to the neutral (ground bus) and the black wire to circuit breaker No. 4.

(4) Print "RACK No. 50" on the door of panel G to identify circuit breaker No. 4.

x. Connect rack No. 1 into power panel G as follows:

(1) Run a No. 12 AWG or larger, 2-conductor cable into the J-390/GR distribution panel. Connect the white wire to the NEUT terminal bar and the black wire to the 115V terminal bar, as shown in Figure 4-9.

(2) Run the cable down the rack, through the cable trench, and into panel G.

(3) Connect the white wire of the cable to the neutral (ground bus) in panel G.

(4) Connect the black wire to the terminal on circuit breaker No. 1.

(5) Print "RACK NO. 1" on the door of panel G to identify circuit breaker No. 1.

y. Using the method described in step "x," connect rack No. 2 to circuit breaker No. 2 in panel G (Fig. 4-9).

z. (Deleted)

aa. Bundle the power cables together in the cable trench and secure as required.

ab. Replace front cover and door on panel G.

ac. With No. 12 AWG, white, insulated wire, ground and strap together telephone terminal chambers No. 1 and No. 2 in telephone cabinet D, as shown in Figures 4-3 and 4-15.

ad. Test telephone pairs No. 1 through No. 51 in the telephone cable that connects terminal chamber E6107 in rack No. 50 with the 51-pair terminal chamber No. 1 located in telephone cabinet D (Fig. 4-15). The terminals designated on terminal chamber E6107 for each pair should be connected to the corresponding terminals of terminal chamber No. 1 in cabinet D. For example, the left and right terminals of pair No. 1 on E6107 must be connected to the left and right terminals of pair No. 1 on terminal chamber No. 1 in cabinet D.

ae. Close the main line power switch located in the generator room.

af. Replace steel covers on the floor trench. Cut off covers where required so they will fit flush with the equipment racks that stand over the floor trench.

ag. Label the jacks in rack No. 50 as shown in Figure 4-17.

4-28. INSTALLATION OF ANTENNAS. (Fig. 4-2, 4-4, 4-7, 4-8, 4-10, and 4-18 through 4-26.) Table 4-24 lists the material supplied for the antenna installation at the receiver site.

4-29. Study Figure 4-18. Then proceed to install the receiver-site antennas as follows:

a. Fasten a type J guy hook to antenna pole No. 1 with a 1/2-in. x 3-1/2 in. lag screw as shown in Figure 4-18. The guy hook is to be mounted 20 feet above ground level.

b. Measure and cut off a 25-foot length of 5/16-inch messenger cable.

c. Wrap one end of the 25-foot cable around antenna pole No. 1 above the guy hook, and clamp with a 3-bolt clamp. Fasten the loose end at the 3-bolt clamp with a wire-rope clip.

d. Thread the remaining messenger cable end through the building eyebolt (Fig. 4-18). Pull cable up taut, and clamp with a 3-bolt clamp.

e. Cut off excess cable at the 3-bolt clamp, and fasten the loose end with a rope clip.

f. Cut one 125-foot length of RG-34/U coaxial cable from the reel furnished.

g. Install a PL-306 plug on one end of the 125-foot length of RG-34/U cable as described below:

(1) Prepare one end of the RG-34/U coaxial cable as shown in Figure 4-19. Maintain the dimensions as closely as possible, and keep the cuts square.

(2) Loosen screws (item 6), and remove plug cover (item 4) as shown in Figure 4-19.

(3) Unscrew the slotted collar (item 1), and remove the plug liner (item 5) and washer (item 7).

(4) With a sharp instrument or a small screwdriver, pry out item 2, which is a circular retaining spring at the contact end of the assembly. Remove the center electrode (item 3).

(5) Remove nut (item 10), washer (item 11), packing (item 16), and collar (item 9).

(6) Clean and tin the exposed portion of the inner conductor of the RG-34/U coaxial cable, being careful to wipe off any excess solder. Slide the nut (item 10), washer (item 11), and packing (item 16) over the prepared end of the cable.

(7) Spread the braid (bell it) slightly, and slip the small threaded collar (item 9) over the white rubber dielectric. Force the collar under the tinned braid and solder the braid to the collar all the way around.

(8) Screw the collar (item 9) with cable attached into the threaded ferrule (item 8).

(9) Place the center electrode (item 3) into the ferrule (item 8) so that the center conductor of the coaxial cable fits into the wire hole located in the center electrode.

(10) In the side of the center electrode is a small hole leading to the hole for the wire. Heat the center electrode (item 3) with the soldering iron, and run solder into the hole in the side. By looking through the holes in the wall of the ferrule (item 8), it can be seen that the end of the center electrode bears against the white rubber dielectric. This should be a tight joint, and no solder should leak past item 3. If a drop or two does leak, pick it out through the large holes. Remove all excess solder to prevent short circuits.

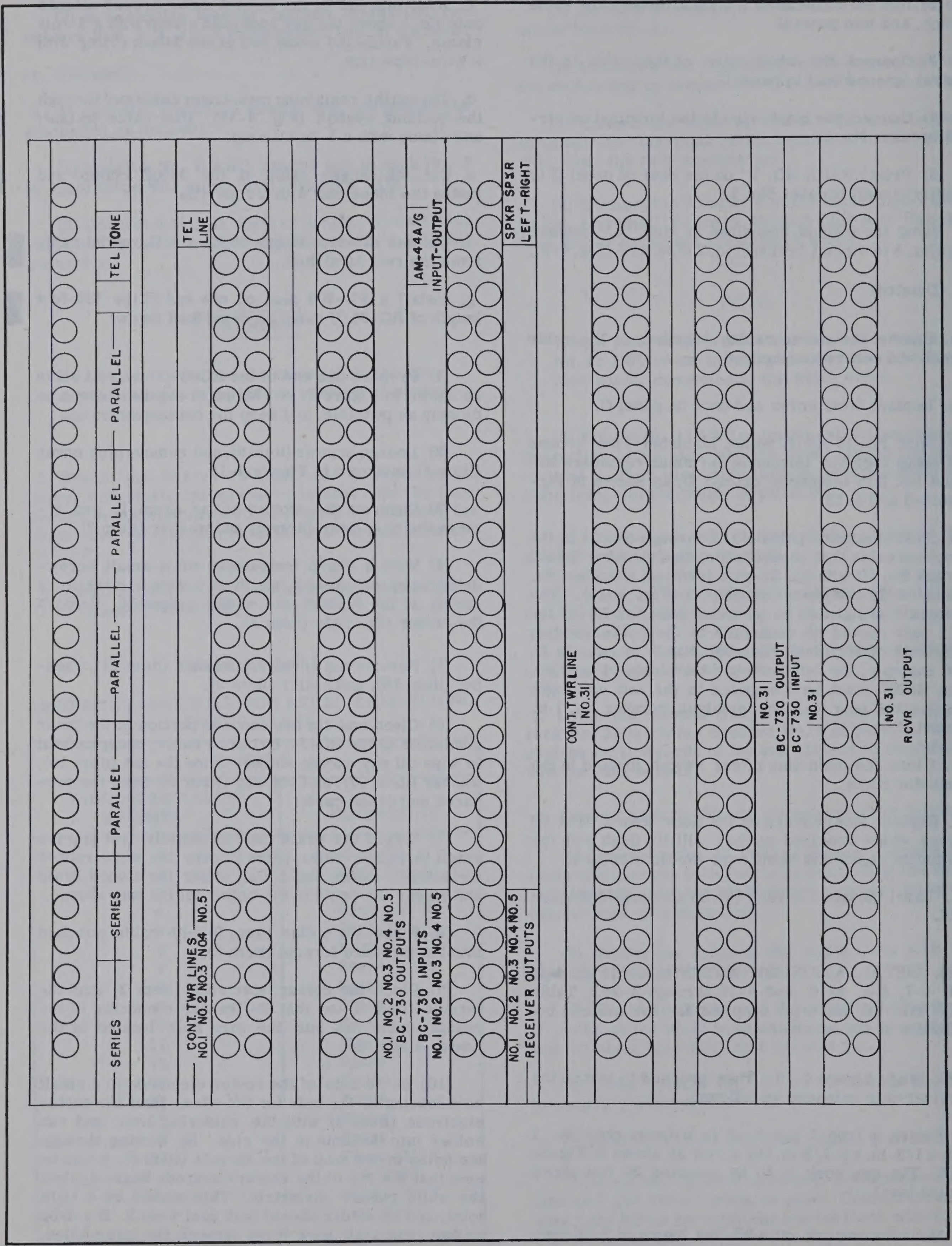

SERIES
SERIES
PARALLEL
PARALLEL
PARALLEL
PARALLEL
PARALLEL
TEL
TONE
CONT. TWR LINES
NO.1 NO.2 NO.3 NO.4 NO.5
TEL LINE
NO.1 NO.2 NO.3 NO.4 NO.5
BC-730 OUTPUTS
BC-730 INPUTS
NO.1 NO.2 NO.3 NO.4 NO.5
AM-44A/G
INPUT-OUTPUT
NO.1 NO.2 NO.3 NO.4 NO.5
RECEIVER OUTPUTS
SPKR SPKR
LEFT-RIGHT
CONT. TWR LINE
NO.31
NO.31
BC-730 OUTPUT
BC-730 INPUT
NO.31
NO.31
RCVR OUTPUT

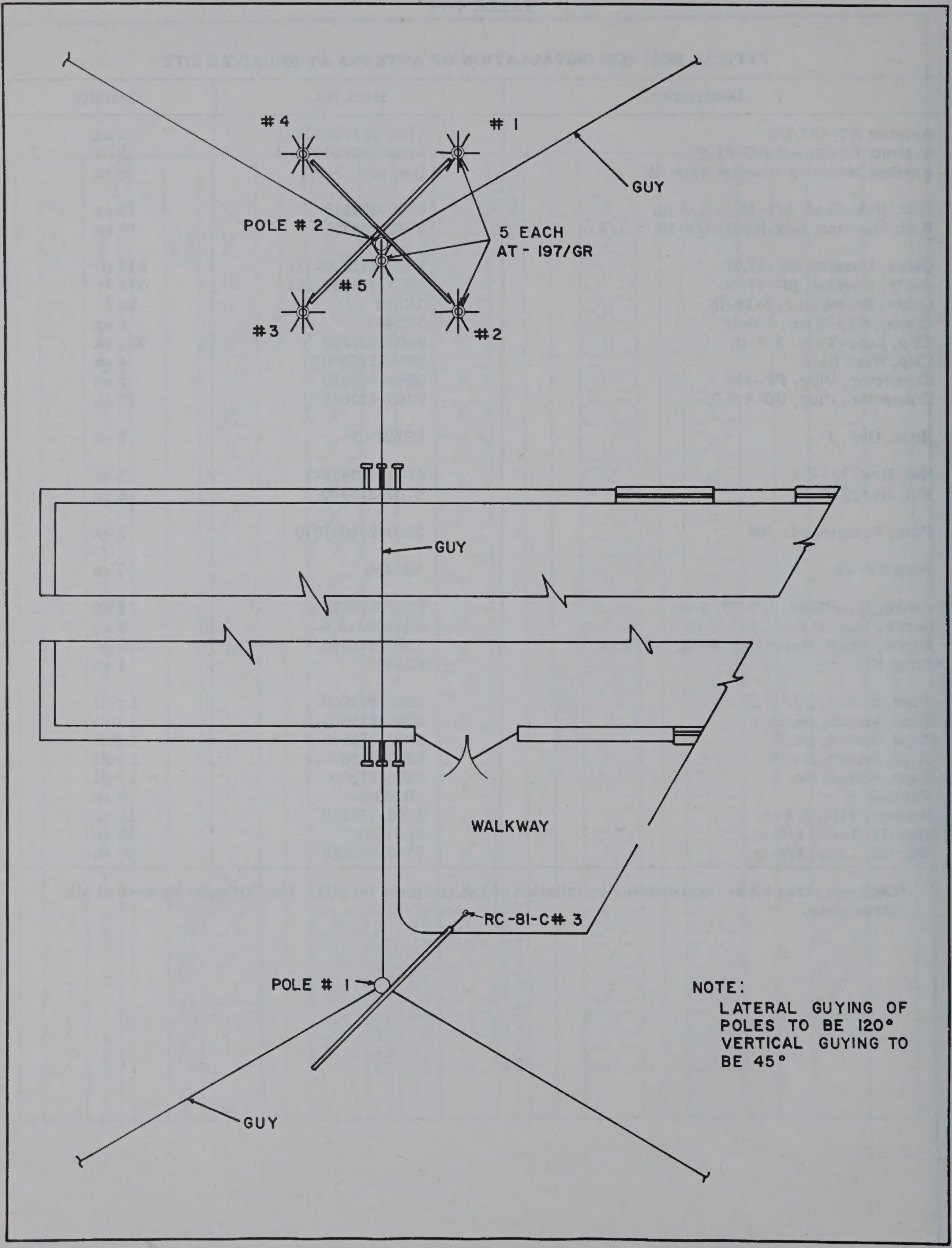
Figure 4-17. Rack No. 50—Identification of Jacks

TABLE 4-24

TYPICAL BOM FOR INSTALLATION OF ANTENNA AT RECEIVER SITE

Description	Stock No.	Quantity
Antenna AT-197/GR	1700-201020803	5 ea
Antenna Equipment RC-81-C	1700-202634000	3 ea
Antenna Mounting Bracket Type "A"	(see par. 3-76)	8 ea
Bolt, Hex-Head, 3/8-16, 1-1/2 in.	6700-054110	12 ea
Bolt, Machine, Hex-Head, 3/8-16, 5-1/2 in.	6700-054750	16 ea
Cable, Coaxial, RG-17/U	8860-313600-211	615 ft
Cable, Coaxial, RG-34/U	8860-328000-211	375 ft
Cable, Messenger, 5/16-in.	1A115	50 ft
Clamp, Guy-Wire, 3 Bolt	5B3461	4 ea
Clip, Loop-Type, 3/4-in.	6500-326650	300 ea
Clip, Wire Rope	6700-195200	4 ea
Connector, Plug, PL-310	8850-463910	3 ea
Connector, Plug, UG-495/U	8850-470035	10 ea
Hook, Guy, J	5B5283.5	2 ea
Nut, Hex, 1/4-20	6700-353499-5	15 ea
Nut, Hex, 3/8-16	6700-356300	16 ea
Plug, Female, PL-306	3300-294087070	3 ea
Ring PF-69	5B9456	30 ea
Screw, Hex-Head, 1/4-20, 1-in.	6700-625720	15 ea
Screw, Lag, 1/2-in., 3-1/2 in.	5B10008-3.5	2 ea
Screw, Wood, Brass, No. 6-32, 1-1/2 in.	6700-815400	600 ea
*Strap Kit	6Z8565	1 ea
Tape, Scotch, No. 1	8800-873600-1	1 roll
Tape, Scotch, No. 2	8800-873600-2	1 roll
Tape, Scotch, No. 3	8800-873600-3	1 roll
Tape, Scotch, No. 4	8800-873600-4	1 roll
Tape, Scotch, No. 5	8800-873600-5	1 roll
Thimble	5B18045	2 ea
Washer, Flat, 3/8-in.	6700-356150	16 ea
Washer, Lock, 1/4-in.	6L71004	15 ea
Washer, Lock, 3/8-in.	6700-990550	28 ea

*Only one strap kit is furnished for installation of the complete facility. This kit must be used at all three sites.



# 4
# 1
GUY
POLE # 2
5 EACH
AT - 197/GR
# 5
# 3
# 2
GUY
WALKWAY
RC-81-C# 3
POLE # 1
NOTE:
LATERAL GUYING OF POLES TO BE 120°
VERTICAL GUYING TO BE 45°
GUY

Figure 4-18 (1 of 2). Antenna Masts—Antenna Installation Details

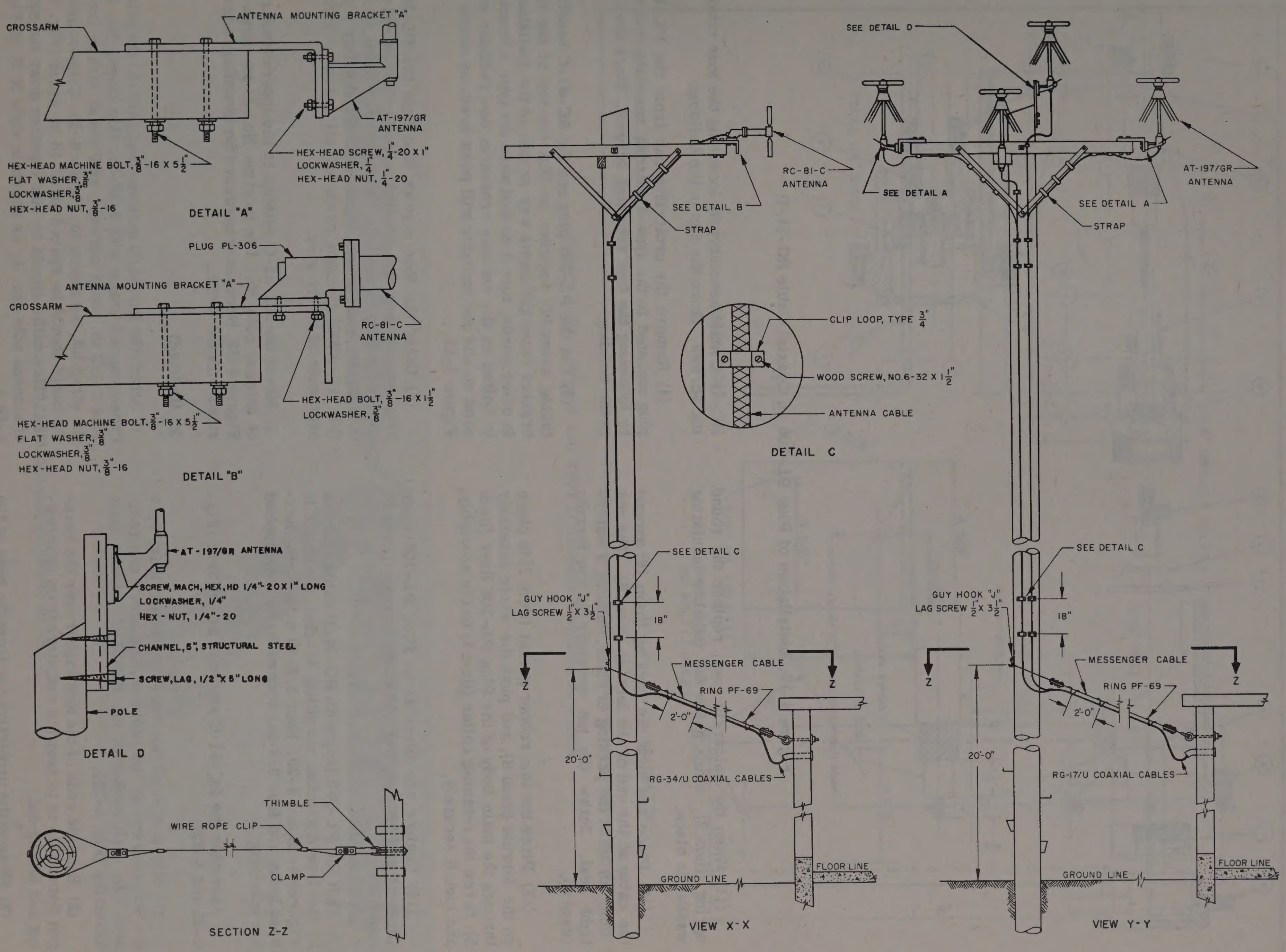

CROSSARM
ANTENNA MOUNTING BRACKET "A"
AT-197/GR ANTENNA
HEX-HEAD SCREW, 1/4"-20 X 1"
LOCKWASHER, 1/4"
HEX-HEAD NUT, 1/4"-20
HEX-HEAD MACHINE BOLT, 3/8"-16 X 5 1/2"
FLAT WASHER, 3/8"
LOCKWASHER, 3/8"
HEX-HEAD NUT, 3/8"-16
DETAIL "A"
PLUG PL-306
ANTENNA MOUNTING BRACKET "A"
CROSSARM
RC-81-C ANTENNA
HEX-HEAD BOLT, 3/8"-16 X 1 1/2"
LOCKWASHER, 3/8"
HEX-HEAD MACHINE BOLT, 3/8"-16 X 5 1/2"
FLAT WASHER, 3/8"
LOCKWASHER, 3/8"
HEX-HEAD NUT, 3/8"-16
DETAIL "B"
AT-197/GR ANTENNA
SCREW, MACH, HEX, HD 1/4"-20 X 1" LONG
LOCKWASHER, 1/4"
HEX - NUT, 1/4"-20
CHANNEL, 5", STRUCTURAL STEEL
SCREW, LAG, 1/2" X 5" LONG
POLE
DETAIL D
THIMBLE
WIRE ROPE CLIP
CLAMP
SECTION Z-Z
RC-81-C ANTENNA
SEE DETAIL B
STRAP
SEE DETAIL C
GUY HOOK "J"
LAG SCREW 1/2" X 3 1/2"
18"
MESSENGER CABLE
RING PF-69
2'-0"
20'-0"
RG-34/U COAXIAL CABLES
GROUND LINE
FLOOR LINE
Z
Z
VIEW X-X
CLIP LOOP, TYPE 3/4"
WOOD SCREW, NO.6-32 X 1 1/2"
ANTENNA CABLE
DETAIL C
SEE DETAIL D
SEE DETAIL A
AT-197/GR ANTENNA
SEE DETAIL A
STRAP
SEE DETAIL C
GUY HOOK "J"
LAG SCREW 1/2" X 3 1/2"
18"
MESSENGER CABLE
RING PF-69
2'-0"
20'-0"
RG-17/U COAXIAL CABLES
GROUND LINE
FLOOR LINE
Z
Z
VIEW Y-Y

Figure 4-18 (2 of 2). Antenna Masts—Antenna Installation Details

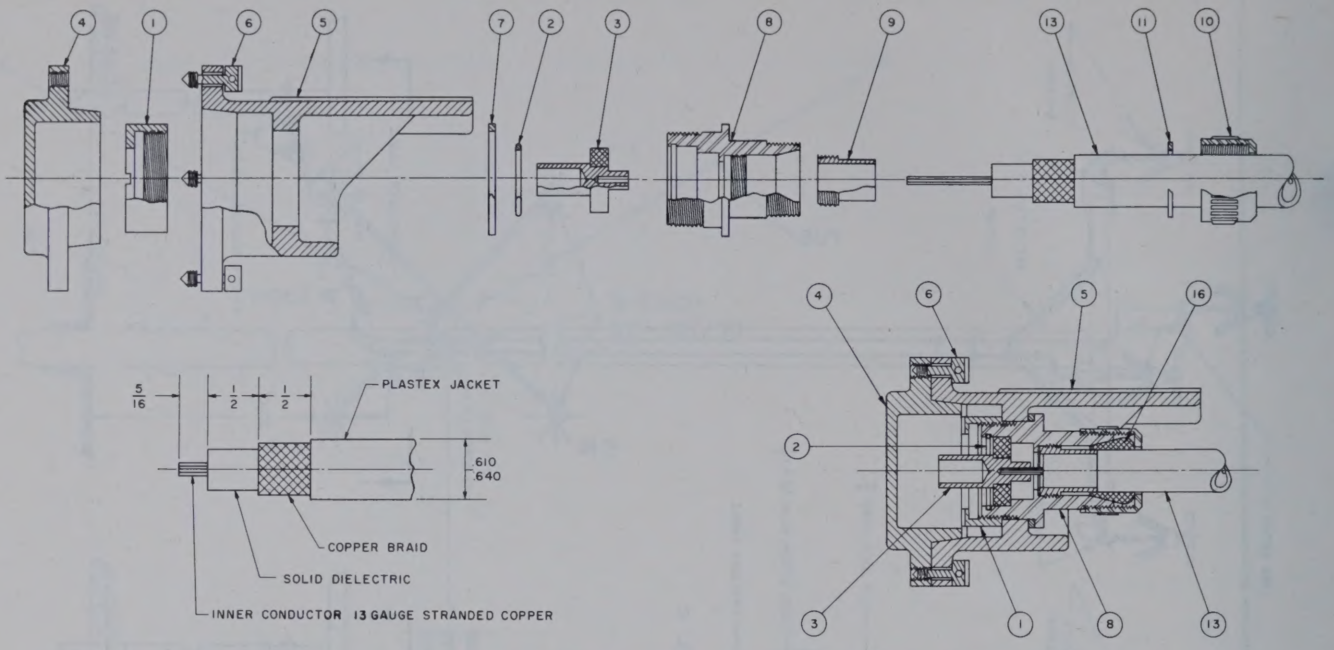


Figure 4-19. Installation of Plug PL-306 on Coaxial Cable RG-34/U

(11) When the solder is cool, replace the round spring (item 2), which holds the bakelite insulating washer in place.

(12) Place and form the packing (item 16) around the cable at the end of the ferrule (item 8). The nut (item 10) holds the packing in place, forming a watertight seal. Screw the nut securely to the ferrule (item 8).

(13) Place the thin rubber gasket (item 7) in place on the ferrule (item 8), and push the whole assembly through the main body of the Plug PL-306 liner (item 5). Screw the retaining collar (item 1) to the assembly, and lock it securely.

(14) Replace cap (item 4) on Plug PL-306 liner (item 5) and tighten four retaining screws (item 6) into the cap.

h. Bolt the PL-306 plug with RG-34/U cable attached to the type A antenna mounting bracket, as shown in Figures 4-18 and 4-20. Four 3/8-16 x 1-1/2 in. hex-head bolts and four 3/8-in. lockwashers are supplied for mounting.

i. Assemble the RC-81-C antennas as follows: (Fig. 4-21 and 4-22):

(1) Slip a special lockwasher (tubing lock) over the threaded end of the radiator, and screw one radiator into each socket of the RC-81-C antenna main assembly (Fig. 4-22).

(2) Bend the ends of the lockwasher over the hexagon flats. This is to keep the radiators from unscrewing and falling out.

(3) Remove the protective cap from the base of the RC-81-C main assembly by loosening the four retaining screws. Store the cap in the building.

(4) Remove the protective cap from the PL-306 plug mounted to the type A antenna mounting bracket by loosening the four retaining screws. Store the cap in the building.

(5) Put the PL-306 plug and the RC-81-C bakelite tubing assembly together so that the top of the flat bracket faces the same way as one of the radiators. In other words, turn it so that when the type A bracket is bolted to the antenna crossarm one radiator will point up and one radiator will point down, as shown in Figure 4-18.

(6) Using the four screws that held the PL-306 plug cap, screw the PL-306 plug to the RC-81-C bakelite tubing assembly. Turn screws until firm; then tighten each snugly in rotation. Feed safety wire (No. 11 AWG) through heads of all screws. Twist over ends of safety wire.

j. Mount the RC-81-C antenna to the upper crossarm of antenna pole No. 1 in location No. 31 as shown in Figure 4-18. Necessary hardware for mounting is provided with the SFEL.

k. (Deleted)

l. Attach the RG-34/U antenna feed cable to the pole, crossarm and brace with 9/16-in. clip loops, No. 6-32 x 1-1/2 in. wood screws, and metal straps from the strap kit, as shown in Figure 4-18. Clip loops on the cable should be spaced about 18 in. apart (Fig. 4-18). (This cable should be run together down the side of antenna pole No. 1, as shown in view X-X of Fig. 4-18.)

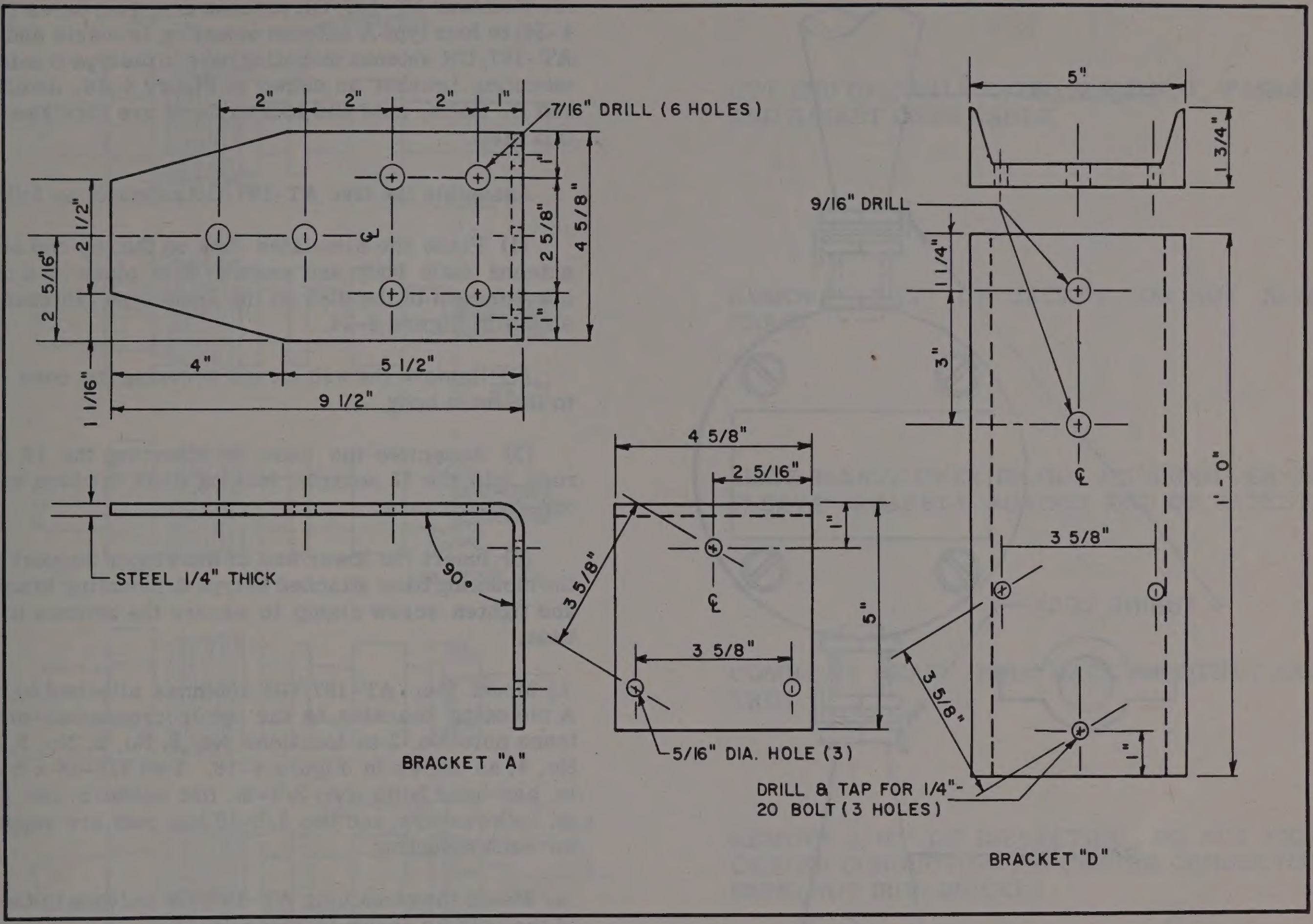

2"
2"
2"
1"
7/16" DRILL (6 HOLES)
1"
2 5/8"
4 5/8"
1"
2 1/2"
2 5/16"
℄
4"
5 1/2"
9 1/2"
1 1/16"
STEEL 1/4" THICK
90°
BRACKET "A"
4 5/8"
2 5/16"
1"
3 5/8"
5"
3 5/8"
5/16" DIA. HOLE (3)
5"
1 3/4"
9/16" DRILL
1 1/4"
3"
1'-0"
3 5/8"
3 5/8"
1"
DRILL & TAP FOR 1/4"-20 BOLT (3 HOLES)
BRACKET "D"

Figure 4-20. Type A and Type D Antenna Mounting Brackets

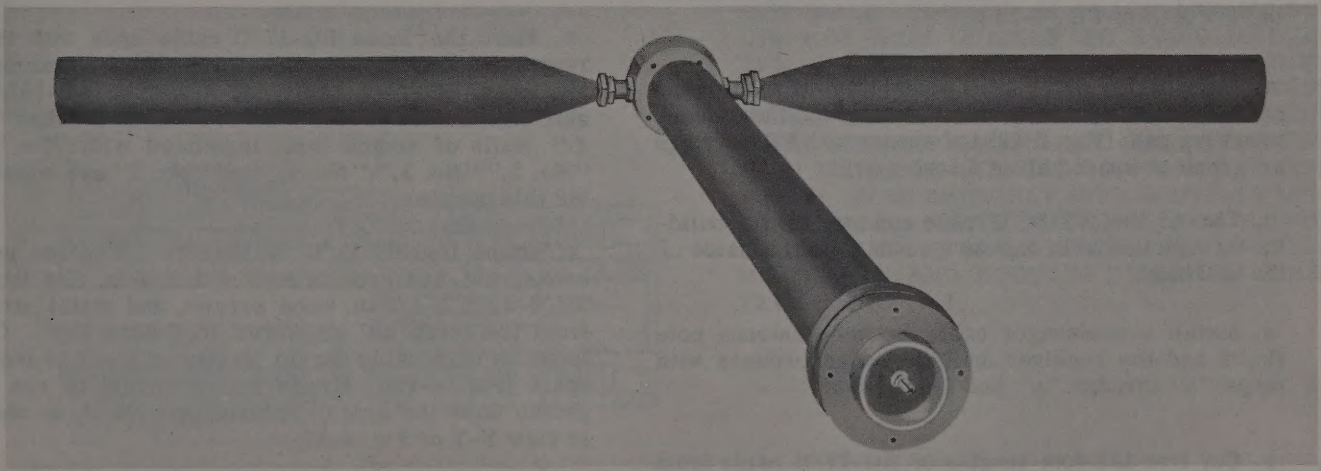


Figure 4-21. Antenna Equipment RC-81-C

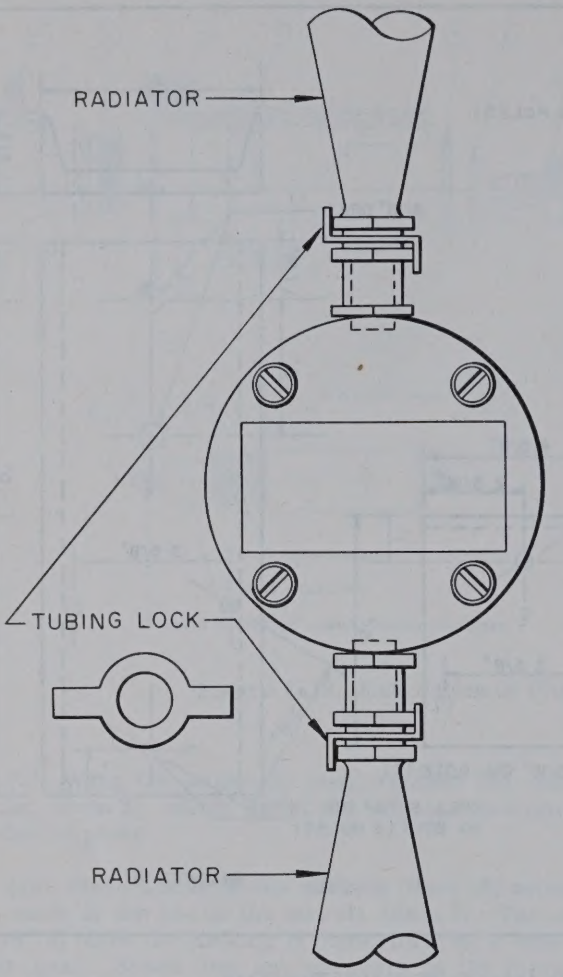


Figure 4-22. Antenna Equipment RC-81-C, Tubing Lock and Radiator Assembly

loops on each cable should be spaced about 18 inches apart (Fig. 4-18). (These cables should be run together down the side of antenna pole No. 1, as shown in view X-X of Fig. 4-18.)

m. Hang the RG-34/U antenna cable No. 31 to the messenger running between the building and the antenna mounting pole (Fig. 4-18) and secure with PF-69 rings or wraplock spaced about 2 feet apart.

n. Thread the RG-34/U cable end nearest the buildint through the cable entrance conduit, to the inside of the building.

o. Install a messenger cable between antenna pole No. 2 and the receiver building in accordance with steps "a" through "e" and Figure 4-18.

p. Cut five 125-foot lengths of RG-17/U cable from the reel of cable furnished as part of the SFEL.

q. Install a Connector Plug UG-495/U on one end of each of the five RG-17/U cable lengths in accordance with Figure 4-23.

r. Bolt four AT-197/GR antenna mounting bases (Fig. 4-24) to four type A antenna mounting brackets and one AT-197/GR antenna mounting base to the type D antenna mounting bracket as shown in Figure 4-18, details A and D. Bolts, nuts and lockwashers are furnished for this step.

s. Assemble the five AT-197/GR antennas as follows:

(1) Place the simulated disk on the top end of the antenna main body and secure it in place by a one-quarter turn of the disk on the Dzus-type fastener, as shown in Figure 4-24.

(2) Remove the web straps securing the cone rods to the main body.

(3) Assemble the cone by inserting the 12 cone rods into the 12 sockets, locking them in place with a one-quarter turn.

(4) Insert the lower end of the center support into the mounting base attached to type A mounting bracket, and tighten screw clamp to secure the antenna to the base.

t. Mount four AT-197/GR antennas attached to type A mounting brackets to the upper crossarms of antenna pole No. 2 in locations No. 1, No. 2, No. 3, and No. 4, as shown in Figure 4-18. Two 3/8-16 x 5-1/2 in. hex-head bolts, two 3/8-in. flat washers, two 3/8-in. lockwashers, and two 3/8-16 hex nuts are supplied for each mounting.

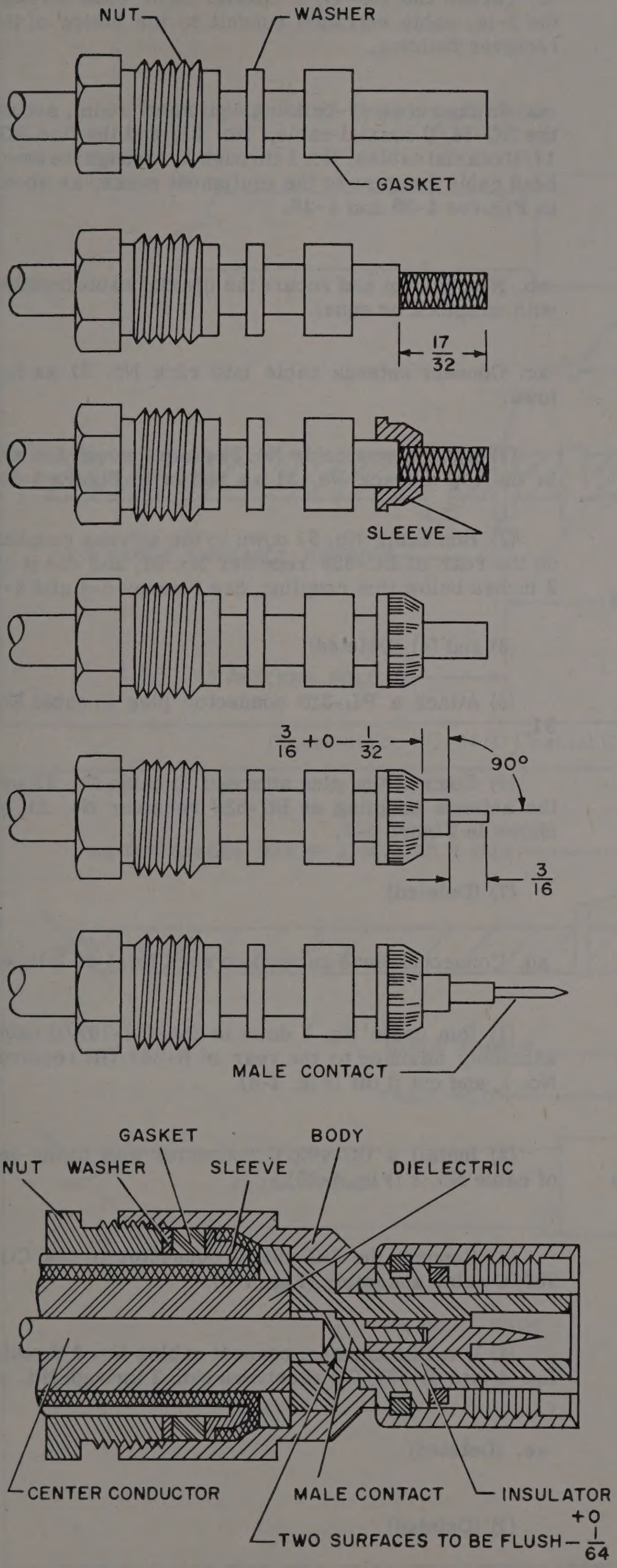
u. Mount the remaining AT-197/GR antenna to the top of the pole as shown in Figure 4-18.

v. Remove the dust caps from the five AT-197/GR antennas located in positions No. 1, No. 2, No. 3, No. 4, and No. 5 (Fig. 4-18), and connect the five 125-foot lengths of RG-17/U cable to these antennas by means of the attached UG-495/U connectors. (The 115-foot cable length is to be attached to antenna No. 5, located on the lower crossarm.)

w. Mark the loose RG-17/U cable ends with their respective antenna numbers (Fig. 4-18). For example, the loose RG-17/U cable end from the AT-197/GR antenna mounted in location No. 1 will be marked "No. 1." Rolls of scotch tape imprinted with "No. 1," "No. 2," "No. 3," "No. 4," and "No. 5" are supplied for this purpose.

x. Attach the RG-17/U antenna cables to the pole, crossarms, and crossbraces with 3/4-in. clip loops, No. 6-32 x 1-1/2 in. wood screws, and metal straps from the strap kit, as shown in Figure 4-18. Clip loops on each cable should be spaced about 18 inches apart (Fig. 4-18). (These cables should be run together down the side of antenna pole No. 2, as shown in view Y-Y of Fig. 4-18.)

y. With PF-69 rings spaced about 2 feet apart (Fig. 4-18), hang the five RG-17/U antenna cables (No. 1, No. 2, No. 3, No. 4, and No. 5) from the messenger cable that runs between the pole and the receiver building.


NUT
WASHER
GASKET
17/32
SLEEVE
3/16 +0 −1/32
90°
3/16
MALE CONTACT
GASKET
BODY
NUT
WASHER
SLEEVE
DIELECTRIC
CENTER CONDUCTOR
MALE CONTACT
INSULATOR
TWO SURFACES TO BE FLUSH +0 −1/64

CUT END OF CABLE EVEN. SLIDE NUT, WASHER AND GASKET ONTO CABLE.

REMOVE 17/32'' OF JACKET. DO NOT NICK BRAID.

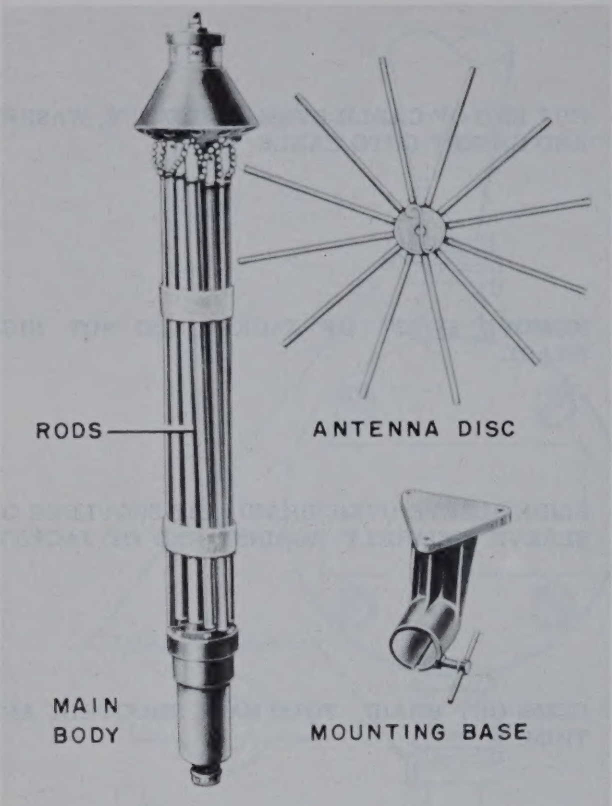
SLIDE SLEEVE OVER BRAID. FIT SHOULDER OF SLEEVE SQUARELY AGAINST END OF JACKET.

COMB OUT BRAID. FOLD BACK SMOOTHLY AND TRIM.

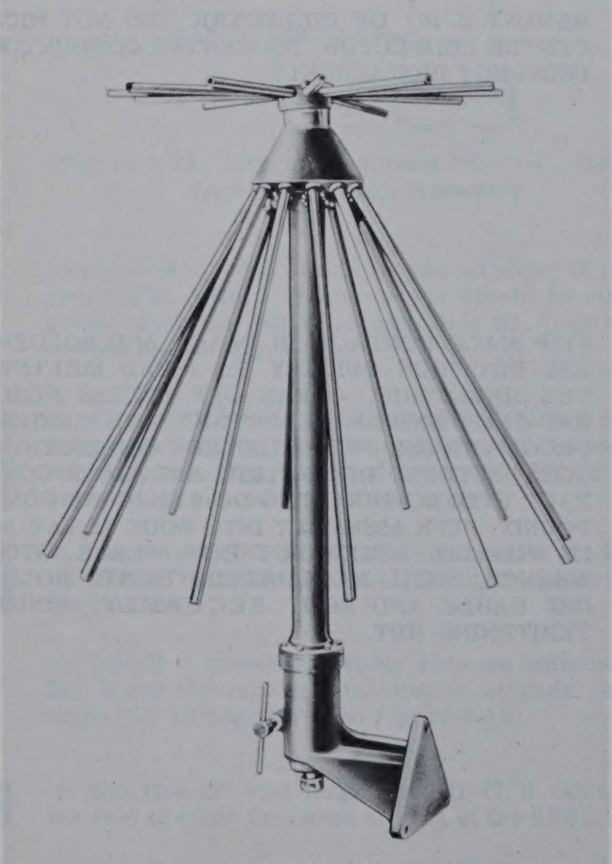
REMOVE 3/16'' OF DIELECTRIC. DO NOT NICK CENTER CONDUCTOR. TIN CENTER CONDUCTOR USING HOT IRON QUICKLY.

SLIP MALE CONTACT IN PLACE AND SOLDER. USE HOT IRON QUICKLY TO AVOID MELTING THE DIELECTRIC. CLEAN OFF EXCESS ROSIN AND DRESS END OF DIELECTRIC. ADD FUNGUS-PROOF VARNISH OVER SOLDERED CONNECTION. COAT EXPOSED DIELECTRIC AND MALE CONTACT WITH DOW-CORNING DC-4 SILICONE COMPOUND. PUSH ASSEMBLY INTO BODY AS FAR AS IT WILL GO. SCREW NUT INTO PLACE, WITH WRENCH, UNTIL MODERATELY TIGHT. HOLDING CABLE AND BODY SECURELY, FINISH TIGHTENING NUT.

Figure 4-23. Installation of Connector Plug UG-495/U on Coaxial Cable RG-17/U



UNASSEMBLED



ASSEMBLED

Figure 4-24. Antenna AT-197/GR

z. Thread the RG-17/U coaxial-cable ends through the 3-in. cable entrance conduit to the inside of the receiver building.

aa. In the receiver-building equipment room, secure the RG-34/U coaxial cable, No. 31, and the five RG-17/U coaxial cables, No. 1 through 5, through the overhead cable hangers to the equipment racks, as shown in Figures 4-25 and 4-26.

ab. Neatly form and secure the coaxial cable together with wraplock or equal.

ac. Connect antenna cable into rack No. 31 as follows:

(1) Run antenna cable No. 31 down through the slot in the top of rack No. 31 as shown in Figure 4-25.

(2) Run cable No. 31 down to the antenna coupling on the rear of BC-639 receiver No. 31, and cut it off 2 inches below this coupling. See Figures 4-4 and 4-7.

(3) and (4) (Deleted)

(5) Attach a PL-310 connector plug to cable No. 31.

(6) Connect the plug attached to cable No. 31 into the antenna coupling of BC-639 receiver No. 31, as shown in Figure 4-7.

(7) (Deleted)

ad. Connect antenna cables into rack No. 1 as follows:

(1) Run cable No. 1 down to the CG-707/U cable assembly attached to the rear of R-361/GR receiver No. 1, and cut it off (Fig. 4-8).

(2) Install a UG-495/U connector plug to the end of cable No. 1 (Fig. 4-23).

(3) Connect the UG-495/U connector to the CG-707/U cable assembly (Fig. 4-8).

(4) In a like manner, connect cables No. 2 through No. 4 into R-361/GR receivers No. 2 through No. 4.

ae. (Deleted)

(1) (Deleted)

af. Connect antenna cables into rack No. 2 as follows:

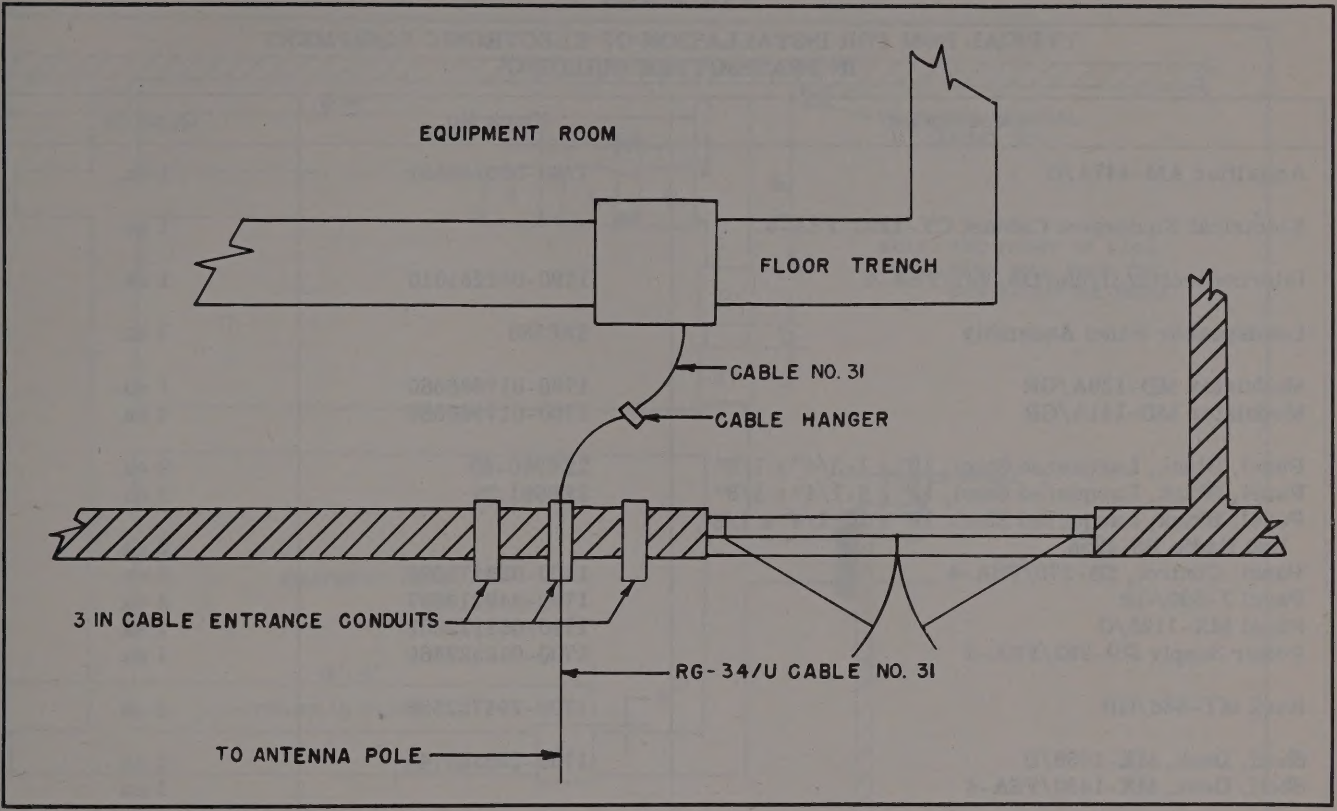

EQUIPMENT ROOM
FLOOR TRENCH
CABLE NO. 31
CABLE HANGER
3 IN CABLE ENTRANCE CONDUITS
RG-34/U CABLE NO. 31
TO ANTENNA POLE

Figure 4-25. RG-34/U Coaxial Cable Routing—Receiver Building

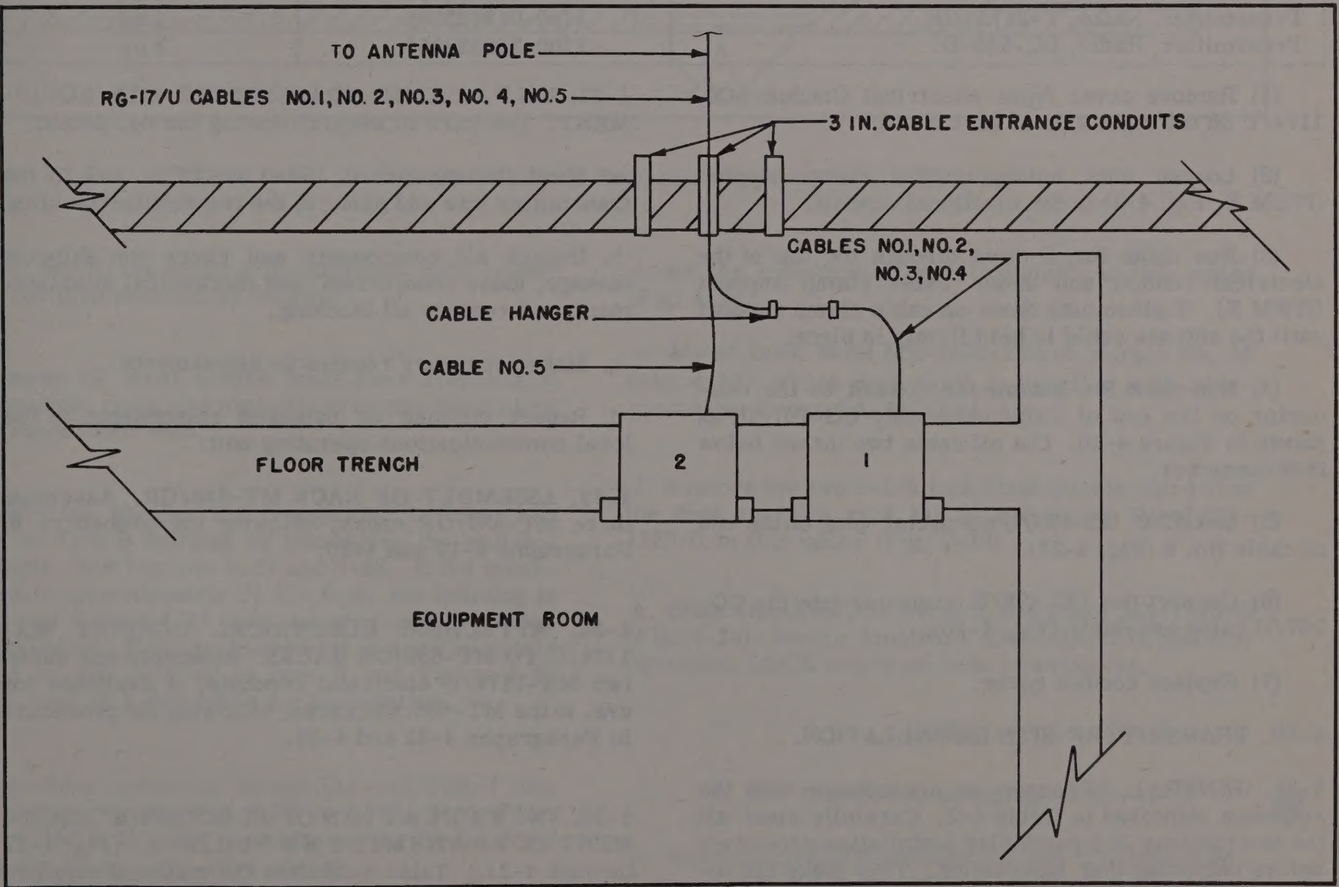

TO ANTENNA POLE
RG-17/U CABLES NO.1, NO. 2, NO.3, NO. 4, NO.5
3 IN. CABLE ENTRANCE CONDUITS
CABLES NO.1, NO.2,
NO.3, NO.4
CABLE HANGER
CABLE NO.5
FLOOR TRENCH
2
1
EQUIPMENT ROOM

Figure 4-26. RG-17/U Coaxial Cable Routing—Receiver Building

TABLE 4-25

TYPICAL BOM FOR INSTALLATION OF ELECTRONIC EQUIPMENT IN TRANSMITTER BUILDING

Description	Stock No.	Quantity
Amplifier AM-447A/G	1790-050140501	1 ea
Electrical Equipment Cabinet CY-1293/FSA-4		1 ea
Interconnecting Group OA-447/FSA-4	1790-052261010	1 ea
Loudspeaker Panel Assembly	2Z6380	1 ea
Modulator MD-129A/GR	1700-017966060	1 ea
Modulator MD-141A/GR	1700-017966050	4 ea
Panel, Blank, Lacquered Steel, 19" x 1-3/4" x 1/8"	2Z6960-60	9 ea
Panel, Blank, Lacquered Steel, 19" x 5-1/4" x 1/8"	2Z6961.26	3 ea
Panel, Blank, Lacquered Steel, 19" x 12-1/4" x 1/8", Bud Radio PS-1256		2 ea
Panel, Control, SB-270/FSA-4	1800-023475070	6 ea
Panel J-390/GR	1700-349213697	3 ea
Panel MX-1125/G	1790-053122002	1 ea
Power Supply PP-992/FSA-4	1700-018522860	1 ea
Rack MT-686/GR	1700-294732588	3 ea
Shelf, Desk, MX-1058/U	1700-295560744	3 ea
Shelf, Desk, MX-1430/FSA-4		1 ea
Transmitter, Radio, T-282/GR	1700-019634000	4 ea
Transmitter, Radio, T-217A/GR	1700-019633005	1 ea
Transmitter, Radio, BC-640-D	1700-222020350	3 ea

(1) Remove cover from Electrical Conduit MX-1174/U on the right side of rack No. 3.

(2) Loosen nuts holding cable clamp support (ITEM E, Fig. 4-2) in the electrical conduit.

(3) Run cable No. 5 down through the top of the electrical conduit and under cable clamp support (ITEM E). Tighten nuts down on cable clamp support until the antenna cable is held firmly in place.

(4) Run cable No. 5 down the conduit to the connector on the end of Cable Assembly CG-707/U, as shown in Figure 4-10. Cut off cable two inches below this connector.

(5) Install a UG-495/U connector plug on the end of cable No. 5 (Fig. 4-23).

(6) Connect the UG-495/U connector into the CG-707/U cable assembly (Fig. 4-10).

(7) Replace conduit cover.

4-30. TRANSMITTER-SITE INSTALLATION.

4-31. GENERAL. Proceed in accordance with the sequence indicated in Table 4-2. Carefully read all the instructions in a particular installation procedure before beginning that installation. Then make the installation by following the steps in the order given herein.

4-32. UNPACKING TRANSMITTER-SITE EQUIPMENT. Use care to avoid damaging the equipment.

a. Move the equipment listed in Table 4-9 to the transmitter site and place in the transmitter building.

b. Unpack all components and check for shipping damage, loose connections, and mechanical misalignment, and remove all blocking.

c. Make necessary repairs or adjustments.

d. Report missing or damaged components to the local communications operating unit.

4-33. ASSEMBLY OF RACK MT-686/GR. Assemble three MT-686/GR racks, following the procedure in Paragraphs 4-19 and 4-20.

4-34. ATTACHING ELECTRICAL CONDUIT MX-1174/U TO MT-686/GR RACKS. Assemble and mount two MX-1174/U electrical conduits, if available for use, to the MT-686/GR racks, following the procedure in Paragraphs 4-22 and 4-23.

4-35. INSTALLATION OF ELECTRONIC EQUIPMENT IN TRANSMITTER BUILDING. (Fig. 4-27 through 4-31.) Table 4-25 lists the material supplied for installation of the electronic equipment in the transmitter building.

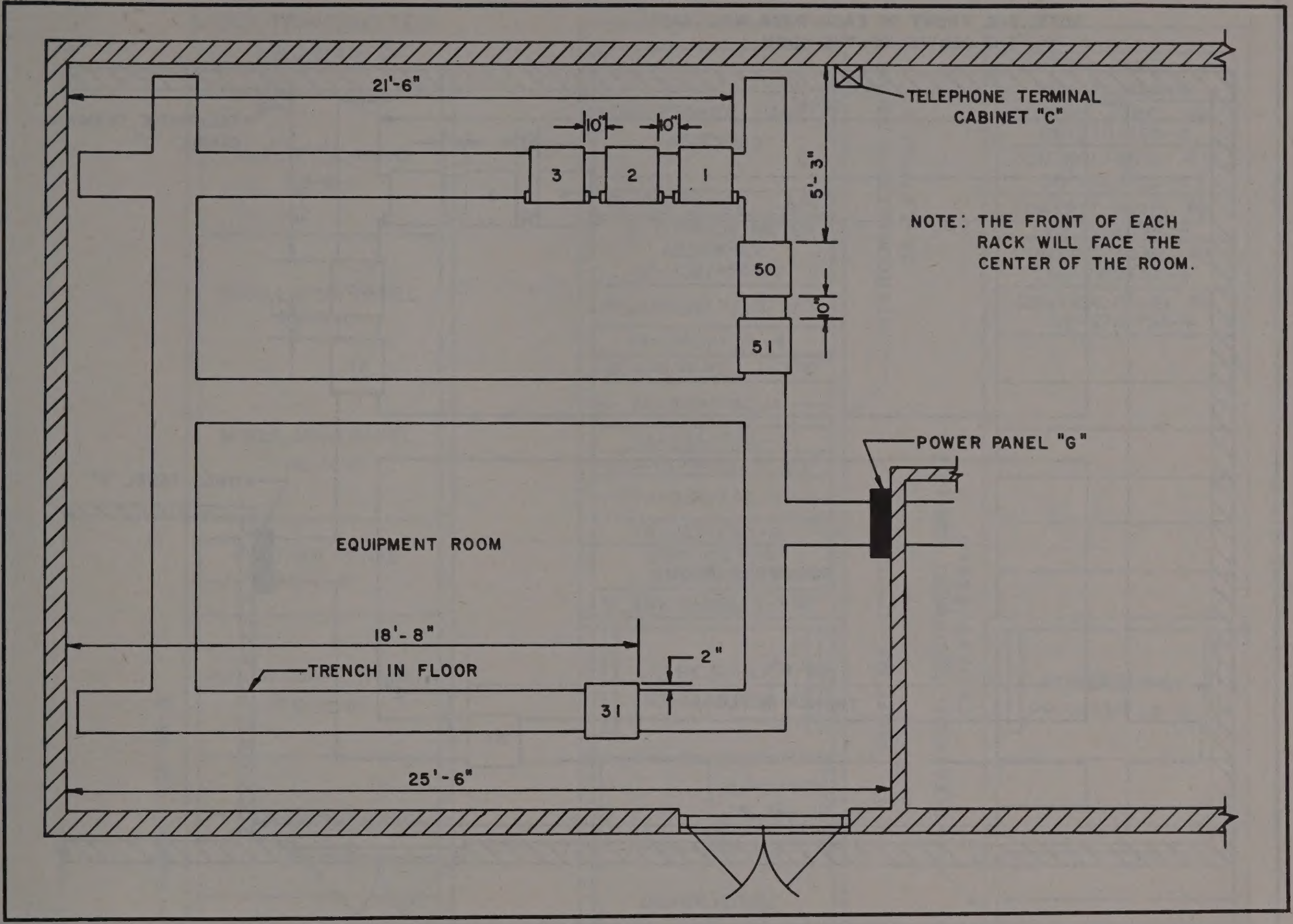

21'-6"
10"
10"
3
2
1
TELEPHONE TERMINAL CABINET "C"
5'-3"
NOTE: THE FRONT OF EACH RACK WILL FACE THE CENTER OF THE ROOM.
50
10"
51
POWER PANEL "G"
EQUIPMENT ROOM
18'-8"
2"
TRENCH IN FLOOR
31
25'-6"

Figure 4-27. Transmitter Building Equipment Layout, Type A Building

4-36. To install the electronic equipment in the transmitter building proceed as follows:

a. Remove all steel covers from floor trenches in the equipment room and place them on the floor along the entrance-door wall.

b. Determine whether the transmitter building is a type A or type B building by measuring the wall-to-wall length. See Figures 4-27 and 4-28. If the measurement is approximately 25 ft - 6 in., the building is type A, and Figure 4-27 must be used as a reference for installation. If the measurement is approximately 35 ft - 4 in., the building is type B, and Figure 4-28 must be used as a reference for installation.

c. Move Interconnecting Group OA-447/FSA-4 into rack position No. 50 (Fig. 4-27 or 4-28). Stencil the letters ''RACK NO. 50'' in white on the front of this rack in the upper right-hand corner.

d. Remove the top blank panel from rack No. 50 and mount the loudspeaker panel assembly in this space (Fig. 4-29).

e. Mount Desk Shelf MX-1430/FSA-4 in rack No. 50 (Fig. 4-29). (This desk shelf is supplied with Interconnecting Group OA-447/FSA-4.)

f. Remove the two 3-1/2 inch blank panels just below the desk shelf in rack No. 50 and mount Panel MX-1125/G in this space (Fig. 4-29).

g. Slide Amplifier AM-447A/G into Panel MX-1125/G (Fig. 4-29). Secure Amplifier AM-447A/G in place by tightening LOCK screw on base of amplifier.

NOTE

See comments, paragraph 3-68.

h. Move Electrical Equipment Cabinet CY-1293/FSA-4 into rack position No. 51 (Fig. 4-27 or 4-28). Stencil the letters ''RACK NO. 51'' in white on the front of this rack in the upper right-hand corner.

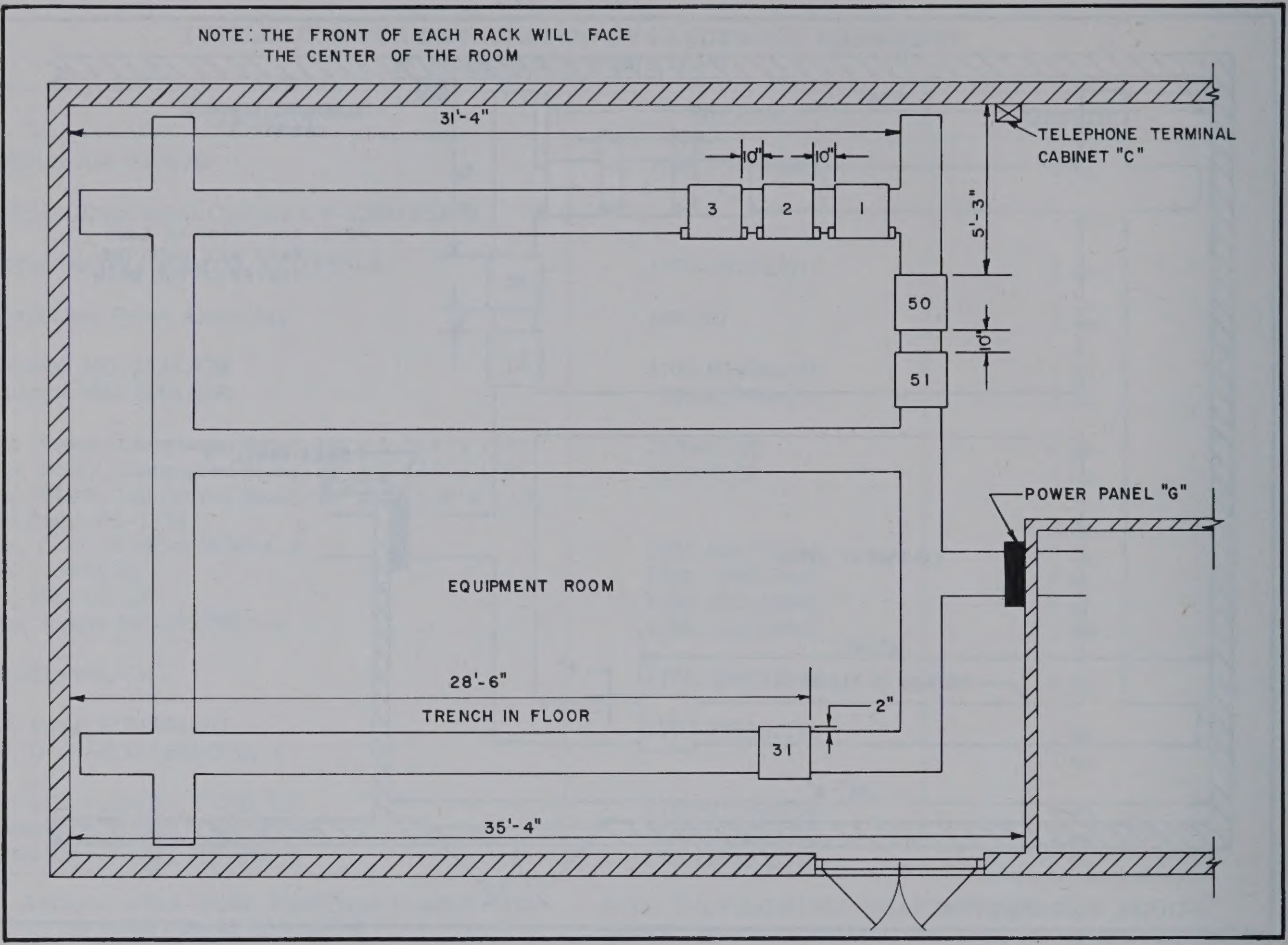

NOTE: THE FRONT OF EACH RACK WILL FACE THE CENTER OF THE ROOM
31'-4"
10"
10"
3
2
1
TELEPHONE TERMINAL CABINET "C"
5'-3"
50
10"
51
POWER PANEL "G"
EQUIPMENT ROOM
28'-6"
2"
TRENCH IN FLOOR
31
35'-4"

Figure 4-28. Transmitter Building Equipment Layout, Type B Building

i. Mount six SB-270/FSA-4 control panels, one PP-1453/FSA-4 power supply and one MX-1430/FSA-4 desk shelf, in rack No. 51, as shown in Figure 4-29.

j. Stencil "RACK NO. 31" on the front of the BC-640-( ) transmitter rack with white paint in the upper right-hand corner.

k. Stencil the letters "RACK NO. 3" in white on the front (upper right-hand corner) along the top of the MT-686/GR rack that has the two MX-1174/U electrical conduits installed on each side. In similar manner stencil "RACK NO. 1" and "RACK NO. 2" respectively on the two remaining MT-686/GR racks.

l. Move these racks (No. 1, No. 2, and No. 3) into position as shown in Figure 4-27 or 4-28. Also move into position rack No. 31 (BC-640-D transmitter).

m. Mount the equipment and blank panels in rack No. 1, as shown in Figure 4-30, using the No. 12-24 rack screws and No. 12 washers supplied with each rack. Begin mounting the equipment in the bottom of the rack and progress to the top.

n. Mount the equipment and blank panels in rack No. 2, as shown in Figure 4-30.

o. Mount the equipment and blank panels in rack No. 3, as shown in Figure 4-30.

p. Stencil numbers on each piece of equipment in rack No. 1, rack No. 2, and rack No. 3 as shown in parentheses in Figure 4-30. For example, the top transmitter in rack No. 1 will have "No. 1" stenciled in white on its front face.

q. Stencil the letters "No. 31" on the front of rack No. 31 in the upper left-hand corner.

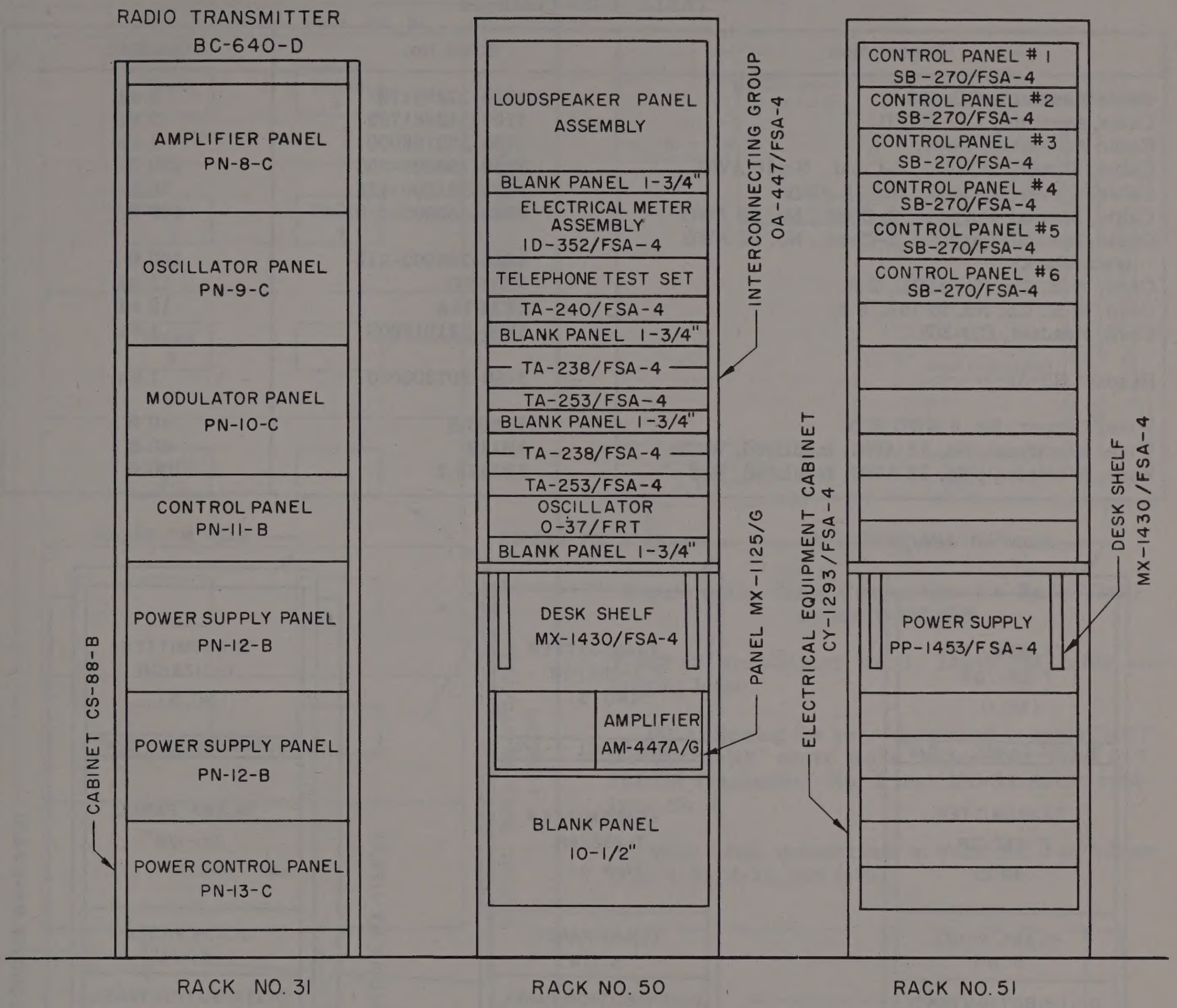

RADIO TRANSMITTER
BC-640-D
AMPLIFIER PANEL
PN-8-C
OSCILLATOR PANEL
PN-9-C
MODULATOR PANEL
PN-10-C
CONTROL PANEL
PN-11-B
POWER SUPPLY PANEL
PN-12-B
POWER SUPPLY PANEL
PN-12-B
POWER CONTROL PANEL
PN-13-C
CABINET CS-88-B
LOUDSPEAKER PANEL
ASSEMBLY
BLANK PANEL 1-3/4"
ELECTRICAL METER
ASSEMBLY
ID-352/FSA-4
TELEPHONE TEST SET
TA-240/FSA-4
BLANK PANEL 1-3/4"
TA-238/FSA-4
TA-253/FSA-4
BLANK PANEL 1-3/4"
TA-238/FSA-4
TA-253/FSA-4
OSCILLATOR
O-37/FRT
BLANK PANEL 1-3/4"
DESK SHELF
MX-1430/FSA-4
AMPLIFIER
AM-447A/G
BLANK PANEL
10-1/2"
INTERCONNECTING GROUP
OA-447/FSA-4
PANEL MX-1125/G
ELECTRICAL EQUIPMENT CABINET
CY-1293/FSA-4
CONTROL PANEL # 1
SB-270/FSA-4
CONTROL PANEL #2
SB-270/FSA-4
CONTROL PANEL #3
SB-270/FSA-4
CONTROL PANEL #4
SB-270/FSA-4
CONTROL PANEL #5
SB-270/FSA-4
CONTROL PANEL #6
SB-270/FSA-4
POWER SUPPLY
PP-1453/FSA-4
DESK SHELF
MX-1430/FSA-4
RACK NO. 31
RACK NO. 50
RACK NO. 51

Figure 4-29. Equipment Layout—Racks No. 31 through No. 33, No. 50, and No. 51

r. Label the top five SB-270/FSA-4 control panels mounted in rack No. 51 as shown in Figure 4-31. For example, the top panel will have "TRANS. 1" printed in its left label holder and "TRANS. 2" in its right holder. The bottom control panel is a spare and is to be left blank.

4-37. CABLE AND WIRING INSTALLATION. (Figs. 4-1, 4-2, 4-13, 4-16, 4-27, 4-28, 4-29, 4-30, and 4-32 through 4-43.) Table 4-26 lists the material supplied to make the cable and wiring installation in the transmitter building.

TABLE 4-26

TYPICAL BOM FOR INSTALLATION OF CABLE AND WIRING IN TRANSMITTER BUILDING

Description	Stock No.	Quantity
Braid, Wire, 1/2-in.	8860-050000-825	40 ft
Cable Assembly CX-1539/U	1700-322847500	1 ea
Cable Assembly CX-1564/U	1700-322847650	1 ea
Cable Assembly CX-1541/U	1700-322847600	5 ea
Cable Assembly CX-2017/U	1700-015662802	4 ea

TABLE 4-26—Continued

Description	Stock No.	Quantity
Cable Assembly CG-693/U	1700-322981797	9 ea
Cable Assembly CG-707/U	1700-322981799	5 ea
Cable Assembly, Power	1760-322758000	1 ea
Cable, Power, WC-643, 2-Cond., No.10 AWG	8860-196000-355	250 ft
Cable, Power, 2-Cond., No. 14 AWG	8860-361000-475	10 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	600 ft
Cable, Special-Purpose, 2-Cond., No. 22 AWG (red, black)	8860-398000-211	100 ft
Cord, W.E. Co. No. 3P7D, 2 ft	3E3P7D	12 ea
Cord, W.E. Co. No. 3P15A, 6 ft	3E3P15A	12 ea
Cord, Headset, CD-308	1790-321018000	1 ea
Headset HS-33	1790-207600000	1 ea
Wire, Copper, No. 6 AWG S.D.	1A806.9	60 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	80 ft
Wire, Electrical, No. 18 AWG, Insulated, Red	1B1318.2	100 ft

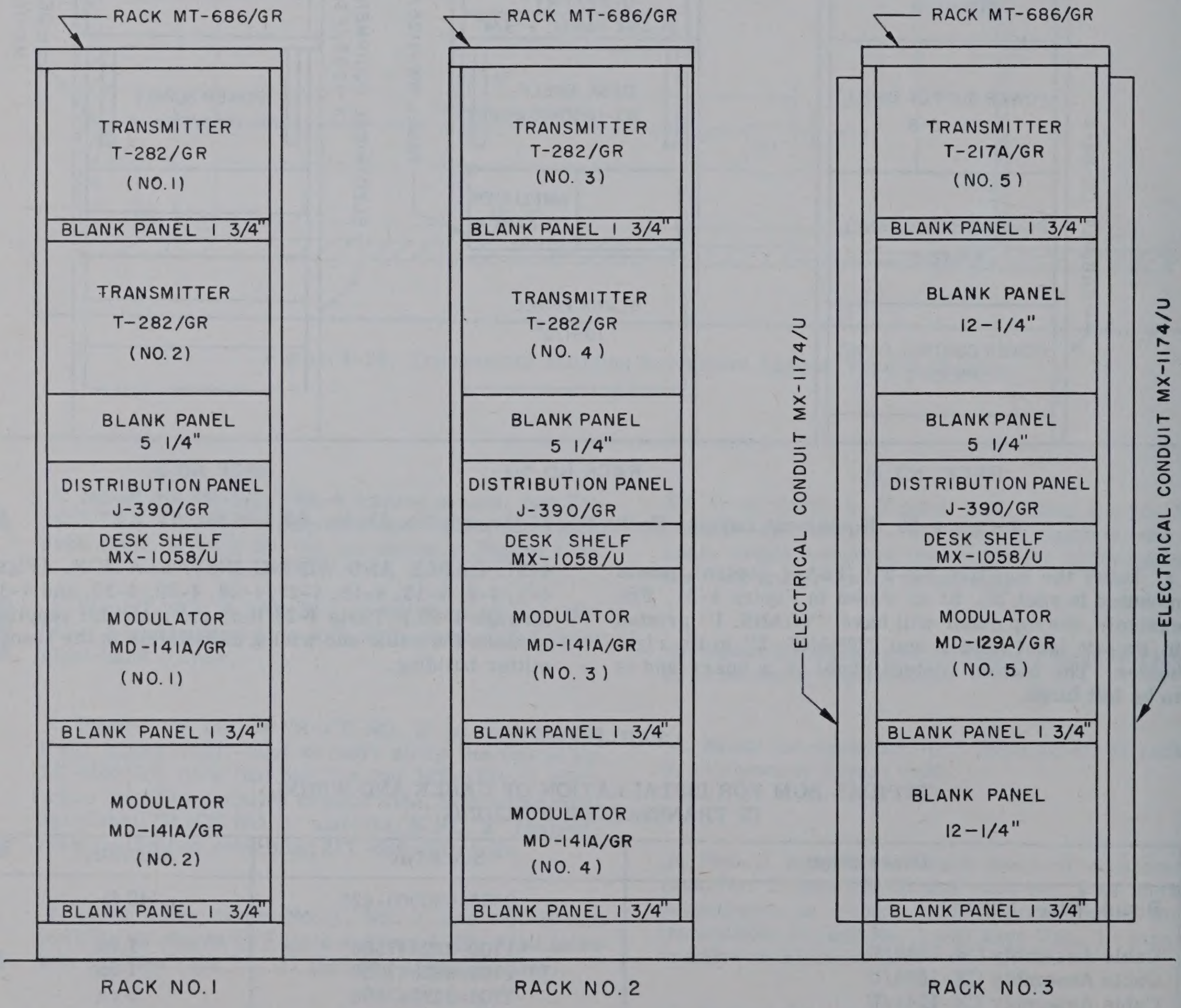

RACK MT-686/GR
TRANSMITTER T-282/GR (NO.1)
BLANK PANEL 1 3/4"
TRANSMITTER T-282/GR (NO. 2)
BLANK PANEL 5 1/4"
DISTRIBUTION PANEL J-390/GR
DESK SHELF MX-1058/U
MODULATOR MD-141A/GR (NO. 1)
BLANK PANEL 1 3/4"
MODULATOR MD-141A/GR (NO. 2)
BLANK PANEL 1 3/4"
RACK NO.1
RACK MT-686/GR
TRANSMITTER T-282/GR (NO. 3)
BLANK PANEL 1 3/4"
TRANSMITTER T-282/GR (NO. 4)
BLANK PANEL 5 1/4"
DISTRIBUTION PANEL J-390/GR
DESK SHELF MX-1058/U
MODULATOR MD-141A/GR (NO. 3)
BLANK PANEL 1 3/4"
MODULATOR MD-141A/GR (NO. 4)
BLANK PANEL 1 3/4"
RACK NO.2
ELECTRICAL CONDUIT MX-1174/U
RACK MT-686/GR
TRANSMITTER T-217A/GR (NO. 5)
BLANK PANEL 1 3/4"
BLANK PANEL 12-1/4"
BLANK PANEL 5 1/4"
DISTRIBUTION PANEL J-390/GR
DESK SHELF MX-1058/U
MODULATOR MD-129A/GR (NO. 5)
BLANK PANEL 1 3/4"
BLANK PANEL 12-1/4"
BLANK PANEL 1 3/4"
ELECTRICAL CONDUIT MX-1174/U
RACK NO.3

Figure 4-30. Equipment Layout—Racks No. 1, No. 2, and No. 3

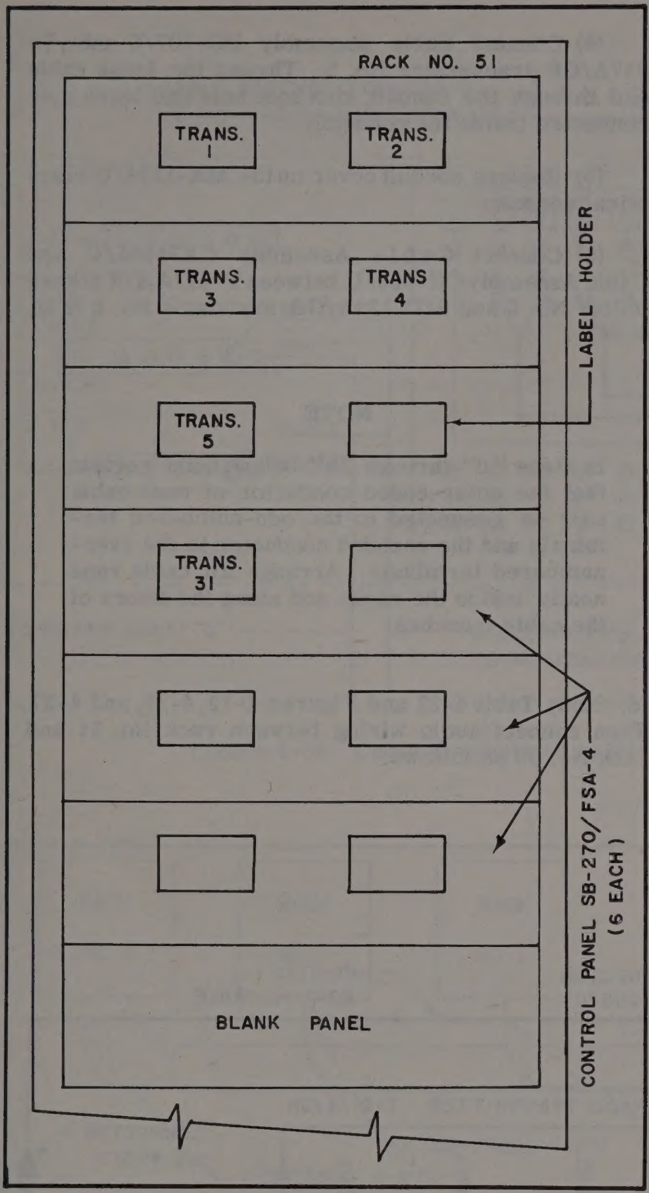

RACK NO. 51
TRANS. 1
TRANS. 2
TRANS. 3
TRANS 4
TRANS. 5
TRANS. 31
LABEL HOLDER
CONTROL PANEL SB-270/FSA-4 (6 EACH)
BLANK PANEL

Figure 4-31. Name-Tag Designations for Control Panels SB-270/FSA-4

4-38. To install the cable and wiring in the transmitter building proceed as follows:

a. Make cable connections in rack No. 1 as follows (Fig. 4-30, 4-32, and 4-33):

(1) Connect one CX-1541/U cable assembly between MD-141A/GR modulator No. 1 and the J-390/-GR distribution panel.

(2) Connect one CX-2017/U cable assembly between T-282/GR transmitter No. 1 and MD-141A/GR modulator No. 1.

(3) Connect two CG-693/U cable assemblies between T-282/GR transmitter No. 1 and MD-141A/GR modulator No. 1.

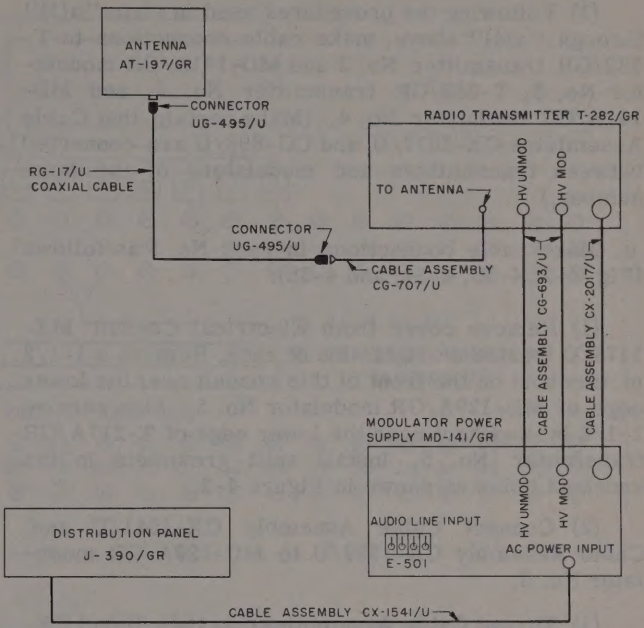

ANTENNA AT-197/GR
CONNECTOR UG-495/U
RADIO TRANSMITTER T-282/GR
RG-17/U COAXIAL CABLE
TO ANTENNA
HV UNMOD
HV MOD
CONNECTOR UG-495/U
CABLE ASSEMBLY CG-707/U
CABLE ASSEMBLY CG-693/U
CABLE ASSEMBLY CX-2017/U
MODULATOR POWER SUPPLY MD-141/GR
HV UNMOD
HV MOD
DISTRIBUTION PANEL J-390/GR
AUDIO LINE INPUT
E-501
AC POWER INPUT
CABLE ASSEMBLY CX-1541/U

Figure 4-32. Cable Connections for Radio Transmitter T-282/GR

(4) Connect one CG-707/U cable assembly to T-282/GR transmitter No. 1. Leave the cable end hanging loose.

(5) Following the procedure used in steps "a(1)" through "a(4)" above make cable connections to T-282/GR transmitter No. 2 and MD-141A/GR modulator No. 2.

b. Make cable connections in rack No. 2 as follows (Fig. 4-30, 4-32, and 4-33):

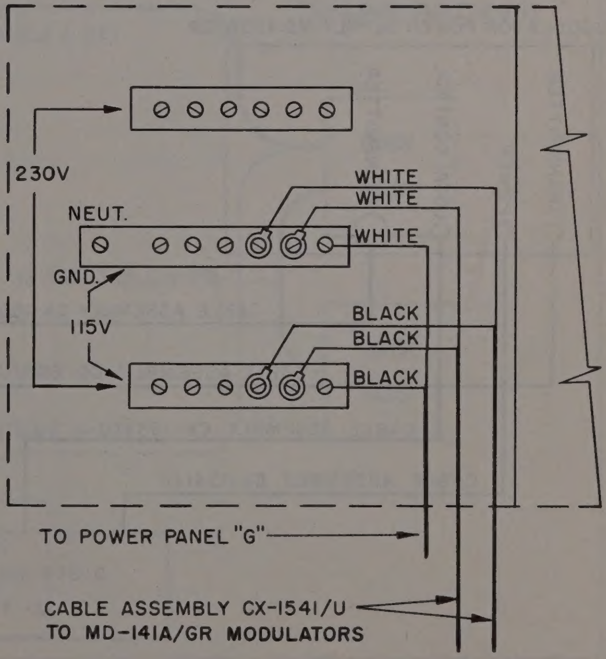

230V
NEUT.
GND.
115V
WHITE
WHITE
WHITE
BLACK
BLACK
BLACK
TO POWER PANEL "G"
CABLE ASSEMBLY CX-1541/U TO MD-141A/GR MODULATORS

Figure 4-33. Cable Connections to Distribution Panel J-390/GR in Racks No. 1 and No. 2

(1) Following the procedures used in steps "a(1)" through "a(4)" above, make cable connections to T-282/GR transmitter No. 3 and MD-141A/GR modulator No. 3, T-282/GR transmitter No. 4, and MD-141A/GR modulator No. 4. (Make certain that Cable Assemblies CX-2017/U and CG-693/U are connected between transmitters and modulators of the same number.)

c. Make cable connections in rack No. 3 as follows (Fig. 4-2, 4-30, 4-34, and 4-35):

(1) Remove cover from Electrical Conduit MX-1174/U located on right side of rack. Remove a 1-1/2 in. knockout on the front of this conduit near the lower edge of MD-129A/GR modulator No. 5. Also remove 1-1/2 in. knockout near the lower edge of T-217A/GR transmitter No. 5. Install split grommets in the knockout holes as shown in Figure 4-2.

(2) Connect Cable Assembly CX-1541/U and Cable Assembly CX-1539/U to MD-129A/GR modulator No. 5.

(3) Thread Cable Assemblies CX-1541/U and CX-1539/U through the 1-1/2 in. knockout hole, up the conduit, and out the metal grommet in the center of the conduit to the J-390/GR panel, as shown in Figure 4-35.

(4) Connect Cable Assembly CG-707/U into T-217A/GR transmitter No. 5. Thread the loose cable end through the conduit knockout hole and leave disconnected inside the conduit.

(5) Replace conduit cover on the MX-1174/U electrical conduit.

(6) Connect Cable Assembly CX-1564/U and Cable Assembly CG-693/U between T-217A/GR transmitter No. 5 and MD-129A/GR modulator No. 5 (Fig. 4-34).

NOTE

In steps "d" through "k" below, make certain that the color-coded conductor of each cable pair is connected to the odd-numbered terminals and the uncoded conductor to the even-numbered terminals. Arrange all cable runs neatly inside the racks and along the floors of the cable trenches.

d. Study Table 4-27 and Figures 4-13, 4-36, and 4-37. Then connect audio wiring between rack No. 31 and rack No. 50 as follows:

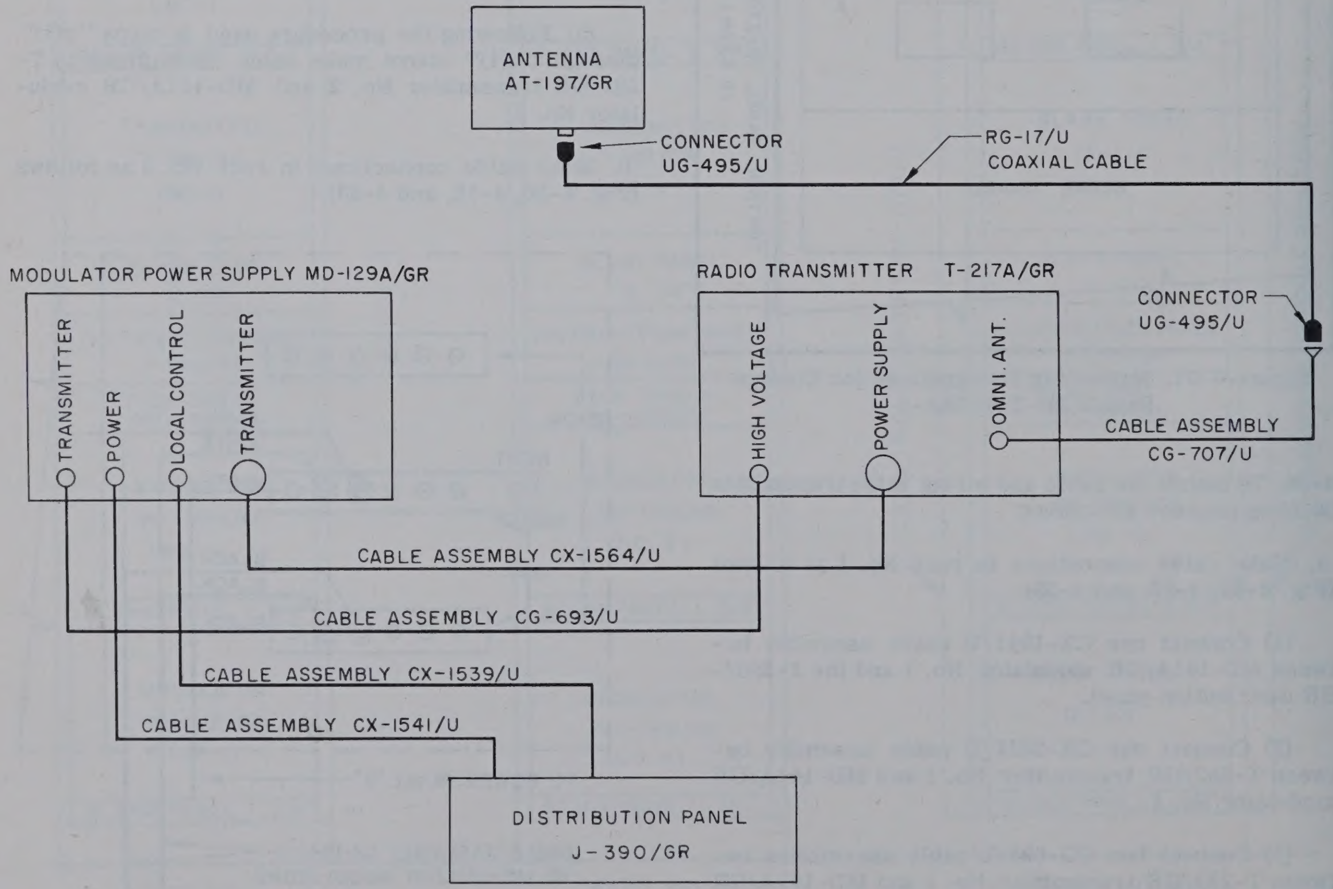

ANTENNA
AT-197/GR
CONNECTOR
UG-495/U
RG-17/U
COAXIAL CABLE
MODULATOR POWER SUPPLY MD-129A/GR
TRANSMITTER
POWER
LOCAL CONTROL
TRANSMITTER
RADIO TRANSMITTER T-217A/GR
HIGH VOLTAGE
POWER SUPPLY
OMNI. ANT.
CONNECTOR
UG-495/U
CABLE ASSEMBLY
CG-707/U
CABLE ASSEMBLY CX-1564/U
CABLE ASSEMBLY CG-693/U
CABLE ASSEMBLY CX-1539/U
CABLE ASSEMBLY CX-1541/U
DISTRIBUTION PANEL
J-390/GR

Figure 4-34. Cable Connections for Radio Transmitter T-217A/GR

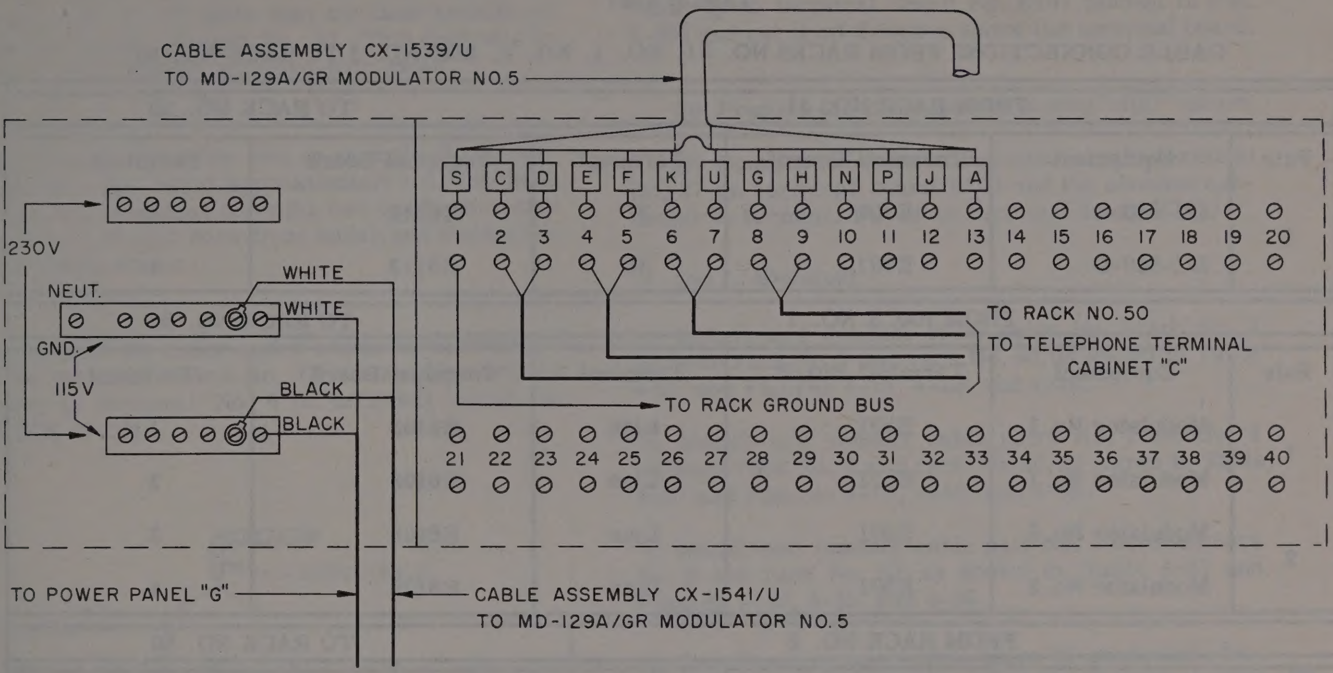

CABLE ASSEMBLY CX-1539/U
TO MD-129A/GR MODULATOR NO. 5
S
C
D
E
F
K
U
G
H
N
P
J
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
230V
WHITE
NEUT.
WHITE
GND.
115V
BLACK
BLACK
TO RACK NO. 50
TO TELEPHONE TERMINAL CABINET "C"
TO RACK GROUND BUS
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
TO POWER PANEL "G"
CABLE ASSEMBLY CX-1541/U
TO MD-129A/GR MODULATOR NO. 5

Figure 4-35. Cable Connections to Distribution Panel J-390/GR in Rack No. 3

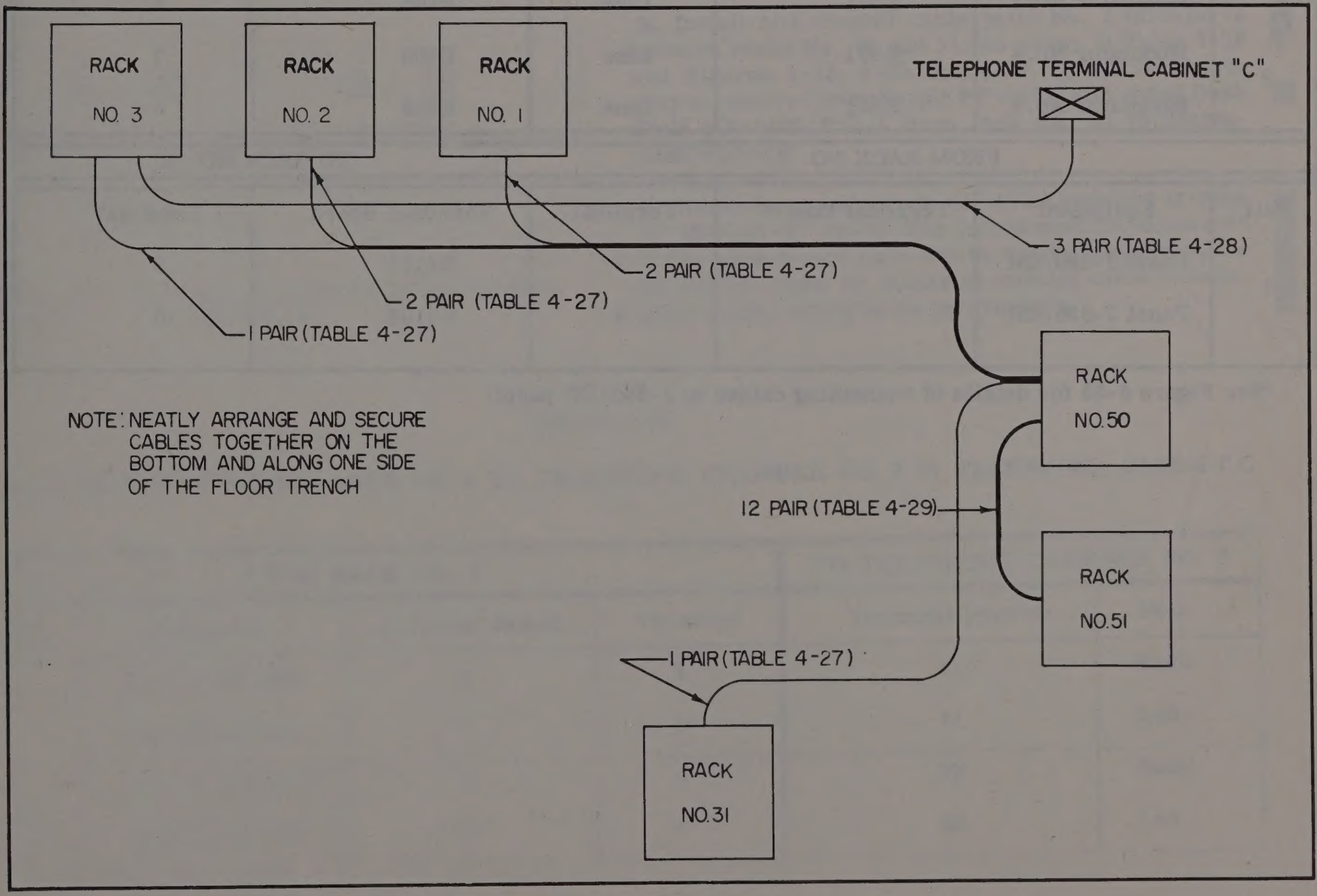

RACK NO. 3
RACK NO. 2
RACK NO. 1
TELEPHONE TERMINAL CABINET "C"
3 PAIR (TABLE 4-28)
2 PAIR (TABLE 4-27)
2 PAIR (TABLE 4-27)
1 PAIR (TABLE 4-27)
RACK NO. 50
NOTE: NEATLY ARRANGE AND SECURE CABLES TOGETHER ON THE BOTTOM AND ALONG ONE SIDE OF THE FLOOR TRENCH
12 PAIR (TABLE 4-29)
RACK NO. 51
1 PAIR (TABLE 4-27)
RACK NO. 31

Figure 4-36. Audio Cabling Between Racks in Transmitter Building

TABLE 4-27

CABLE CONNECTIONS FROM RACKS NO. 31, NO. 1, NO. 2, AND NO. 3 TO RACK NO. 50

FROM RACK NO. 31				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	BC-640-D	E701	37	E6112	3
	BC-640-D	E701	36	E6112	4

FROM RACK NO. 1				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Modulator No. 1	E501	Line	E6108	1
	Modulator No. 1	E501	Line	E6108	2
2	Modulator No. 2	E501	Line	E6108	3
	Modulator No. 2	E501	Line	E6108	4

FROM RACK NO. 2				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Modulator No. 3	E501	Line	E608	5
	Modulator No. 3	E501	Line	E608	6
2	Modulator No. 4	E501	Line	E608	7
	Modulator No. 4	E501	Line	E608	8

FROM RACK NO. 3				TO RACK NO. 50	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Panel J-390/GR	*	9	E6108	9
	Panel J-390/GR	*	8	E6108	10

*See Figure 4-35 for details of connecting cables to J-390/GR panel.

(1) Run cable pair No. 1 (Table 4-27) from the inside of rack No. 31 down into the floor trench and over to the inside of rack No. 50. This pair is a 2-conductor, No. 20 AWG, shielded-pair cable.

(2) Prepare the cable end in rack No. 50 by cutting back the outer braid (approximately 1-1/4 inches), removing the insulation from the two conductors (approximately 1/2-inch back from ends), and tinning the bare ends with solder.

(3) Connect the color-coded conductor to terminal No. 3 on terminal board No. E6112 and the uncoded conductor to terminal No. 4 on terminal board No. E6112 (Fig. 4-13).

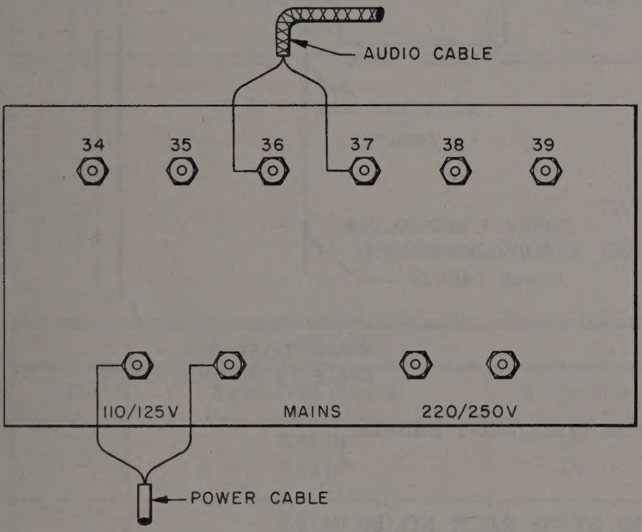


Figure 4-37. Terminal Board E701 on Transmitter BC-640-D

(4) At rack No. 31 extend the 2-conductor audio cable up to terminal board No. E701 (shown in Fig. 4-37) and cut if off 2 inches above the terminal board.

(5) Prepare the cable end as in step "d(2)" above.

(6) Connect the color-coded conductor to terminal No. 37 on terminal board E701 and the uncoded conductor to terminal No. 36 on terminal board E701.

e. and f. (Deleted)

g. Install and connect cable pairs No. 1 and No. 2 between rack No. 1 and rack No. 50, as shown in Table 4-27 and Figures 4-13, 4-32, and 4-36.

h. Install and connect cable pairs No. 1 and No. 2 between rack No. 2 and rack No. 50, as shown in Table 4-27 and Figures 4-13, 4-32, and 4-36.

i. Install and connect cable pair No. 1 between rack No. 3 and rack No. 50, as shown in Table 4-27 and Figures 4-13, 4-35, and 4-36.

j. Install and connect cable pairs (2-conductor, No. 20 AWG, shielded pair) No. 1 and No. 2 between rack No. 3 and telephone chamber No. 2 in telephone cable cabinet C, as shown in Table 4-28, and Figures 4-27, 4-35, 4-36 and 4-38.

k. Install and connect cable pairs No. 1 through 12 between racks No. 50 and 51, as shown in Table 4-29 and Figures 4-13, 4-36, and 4-39. (It will be necessary to remove Power Supply PP-1453/FSA-4 and Desk Shelf MX-1430/FSA-4 from rack No. 51 to accomplish wiring.)

l. Neatly form and secure all cables installed in steps "d" through "k" above. The cables must lie on one side of the cable-trench floor and be neatly mounted on the insides of racks by means of existing cable clamps, cable rings, lacing twine or wraplock.

TABLE 4-28

CABLE CONNECTIONS FROM RACK NO. 3 TO TELEPHONE CHAMBER NO. 2 IN TELEPHONE CABINET C

FROM RACK NO. 3				TO TELEPHONE CHAMBER NO. 2	
Pair	Equipment	Terminal Board	Terminal	Terminal Pair No.	Post
1	Panel J-390/GR	*	3	11	Right
	Panel J-390/GR	*	2	11	Left
2	Panel J-390/GR	*	5	36	Right
	Panel J-390/GR	*	4	36	Left

*See Figure 4-35 for details of connecting cables to J-390/GR panel.

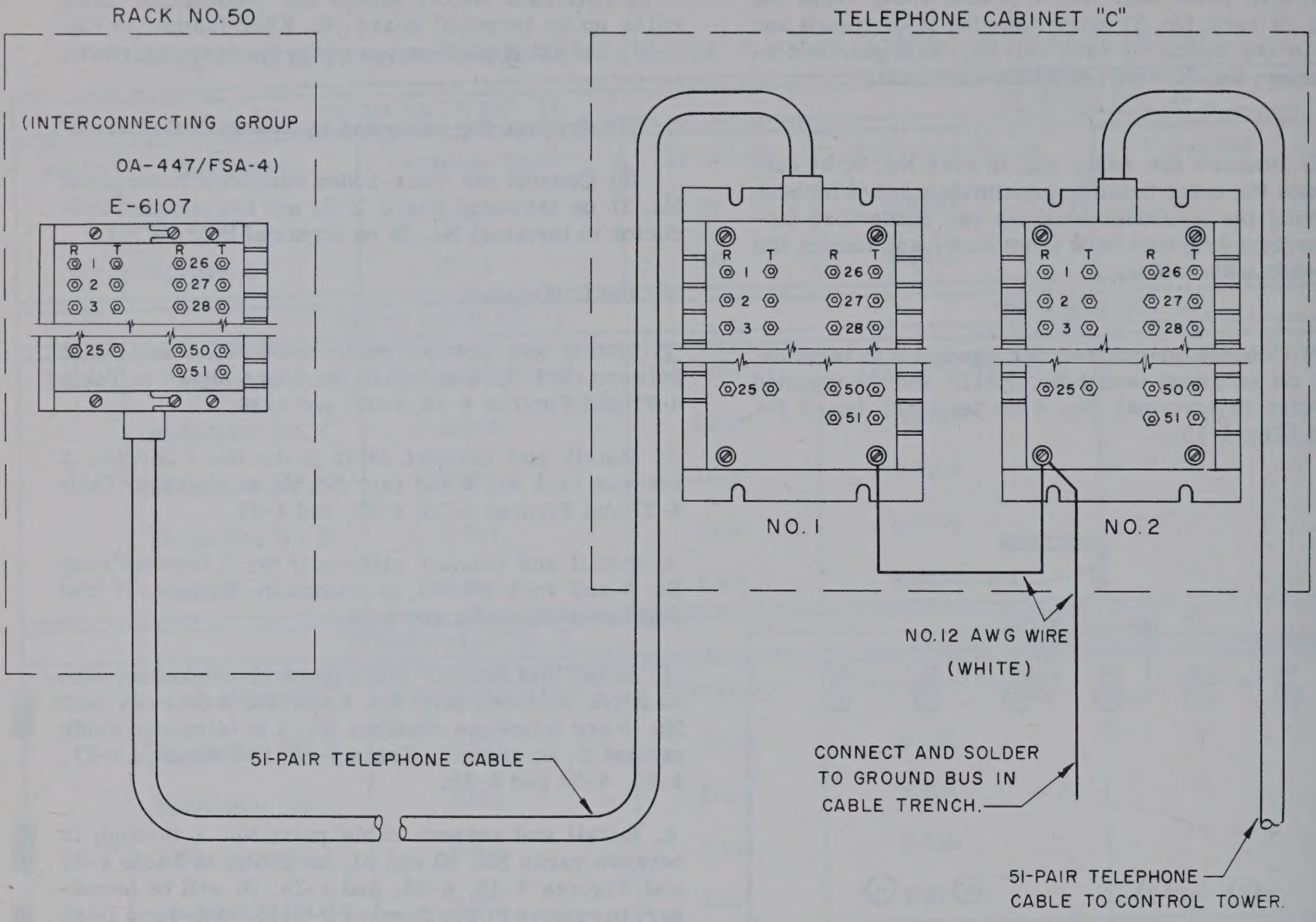

RACK NO.50
(INTERCONNECTING GROUP
OA-447/FSA-4)
E-6107
R T R T
1 26
2 27
3 28
25 50
51
TELEPHONE CABINET "C"
R T R T
1 26
2 27
3 28
25 50
51
NO.1
NO.2
NO.12 AWG WIRE
(WHITE)
51-PAIR TELEPHONE CABLE
CONNECT AND SOLDER
TO GROUND BUS IN
CABLE TRENCH.
51-PAIR TELEPHONE
CABLE TO CONTROL TOWER.

Figure 4-38. Telephone Terminal Chambers in Transmitter Building

TABLE 4-29

CABLE CONNECTIONS FROM RACK NO. 51 TO RACK NO. 50

FROM RACK NO. 51			TO RACK NO. 50	
Pair	Terminal Board	Terminal	Terminal Board	Terminal
1	E4201 E4201	1 2	E6101 E6101	1 2
2	E4201 E4201	5 6	E6101 E6101	3 4
3	E4201 E4201	9 10	E6101 E6101	5 6
4	E4202 E4202	13 14	E6101 E6101	7 8
5	E4202 E4202	17 18	E6101 E6101	9 10
6	E4203 E4203	1 2	E6105 E6105	3 4
7	E4203 E4203	5 6	E6105 E6105	5 6

TABLE 4-29—Continued

FROM RACK NO. 51			TO RACK NO. 50	
Pair	Terminal Board	Terminal	Terminal Board	Terminal
8	E4203 E4203	9 10	E6105 E6105	7 8
9	E4213 E4213	1 2	E6114 E6114	1 2
10	E4213 E4213	5 6	E6114 E6114	3 4
11	E4213 E4213	9 10	E6114 E6114	5 6
12	E4214 E4214	13 14	E6114 E6114	7 8

TABLE 4-30

INTERNAL CABLE CONNECTIONS IN RACK NO. 50

- FROM -			- TO -		
Pair	Terminal Board	Terminal	Equipment	Terminal Board	Terminal
1	E6110 E6110	13 14	Left Speaker Left Speaker	Input Input	1 2
2	E6110 E6110	15 16	Right Speaker Right Speaker	Input Input	1 2
3	E6116 E6116	11 12	Panel MX-1125/G Panel MX-1125/G	E201 E201	1 6
4	E6116 E6116	13 14	Panel MX-1125/G Panel MX-1125/G	E201 E201	7 11

m. Install and connect cable pairs No. 1 through No. 4 between equipment and terminal boards in rack No. 50 (Interconnecting Group OA-447/FSA-4) as shown in Table 4-30 and Figures 4-13 and 4-16.

n. Make cable connections in rack No. 50 as follows:

(1) Connect Cable Assembly CX-2264/U (part of OA-447/FSA-4) into the rear of Oscillator OA-37/FRT as shown in Figure 4-13.

(2) Connect Cable Assembly CX-2263/U (part of OA-447/FSA-4) into the oscillator and a rack receptacle as shown in Figure 4-13.

(3) Connect the wires of the power-cable assembly (Table 4-26) to the two terminals No. 14 (115V, 50/60 cps) on Mounting Panel MX-1125/G (Fig. 4-16), and insert the plug on the other end of this cable assembly into an a-c receptacle on the side of the rack.

o. At the cable trench under racks No. 1, 2, 3, 31, 50, and 51, secure shielded audio lines together by the shields and connect to the ground bus in the cable trench.

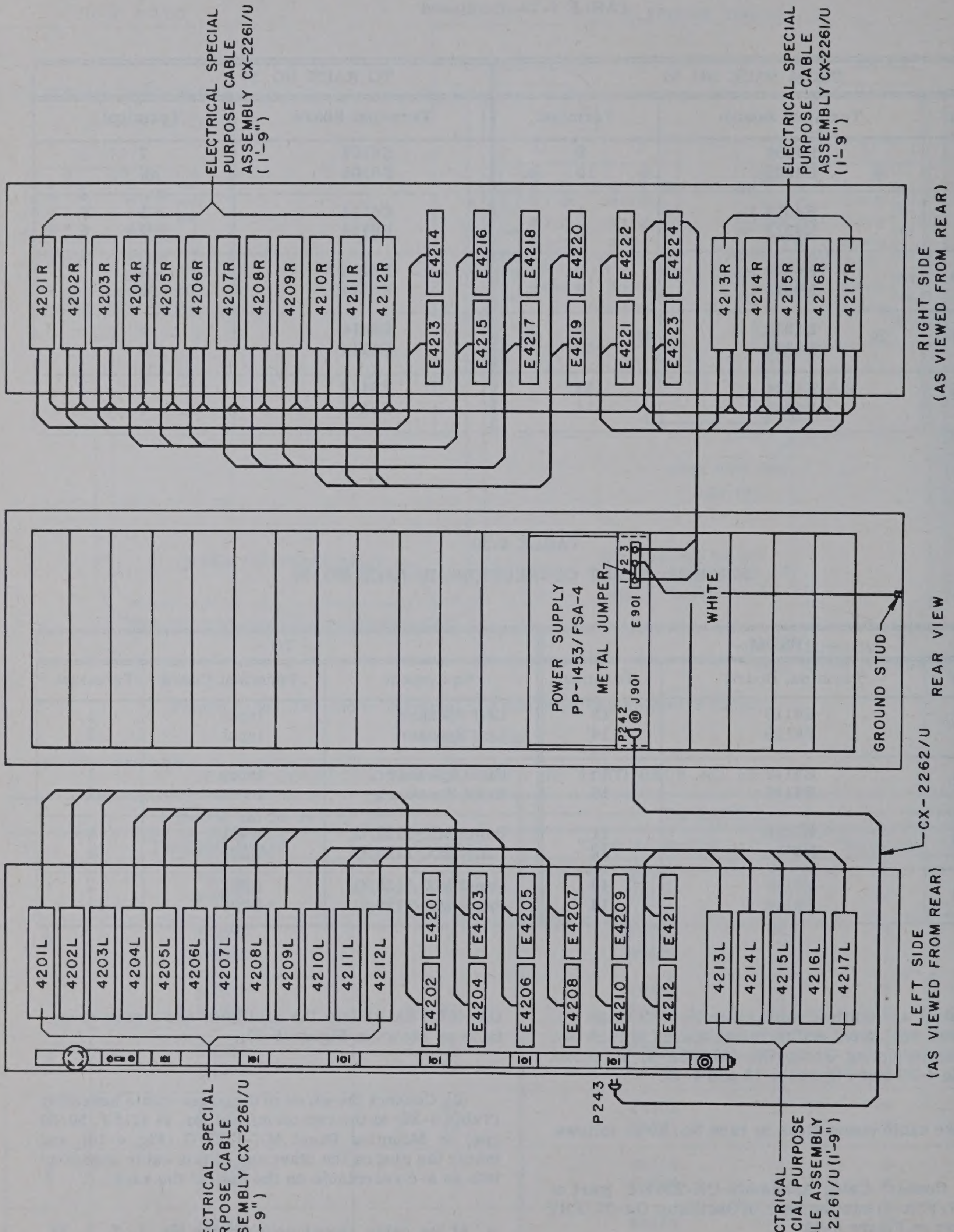

ELECTRICAL SPECIAL PURPOSE CABLE ASSEMBLY CX-2261/U (1'-9")
4201R
4202R
4203R
4204R
4205R
4206R
4207R
4208R
4209R
4210R
4211R
4212R
E4213
E4214
E4215
E4216
E4217
E4218
E4219
E4220
E4221
E4222
E4223
E4224
4213R
4214R
4215R
4216R
4217R
ELECTRICAL SPECIAL PURPOSE CABLE ASSEMBLY CX-2261/U (1'-9")
RIGHT SIDE (AS VIEWED FROM REAR)
POWER SUPPLY PP-1453/FSA-4
METAL JUMPER
E901
1 2 3
P242
J901
WHITE
GROUND STUD
REAR VIEW
CX-2262/U
4201L
4202L
4203L
4204L
4205L
4206L
4207L
4208L
4209L
4210L
4211L
4212L
E4201
E4202
E4203
E4204
E4205
E4206
E4207
E4208
E4209
E4210
E4211
E4212
4213L
4214L
4215L
4216L
4217L
LEFT SIDE (AS VIEWED FROM REAR)
P243
ELECTRICAL SPECIAL PURPOSE CABLE ASSEMBLY CX-2261/U (1'-9")
ELECTRICAL SPECIAL PURPOSE CABLE ASSEMBLY CX-2261/U (1'-9")

Figure 4-39. Electrical Equipment Cabinet CY-1293/FSA-4, Rear View

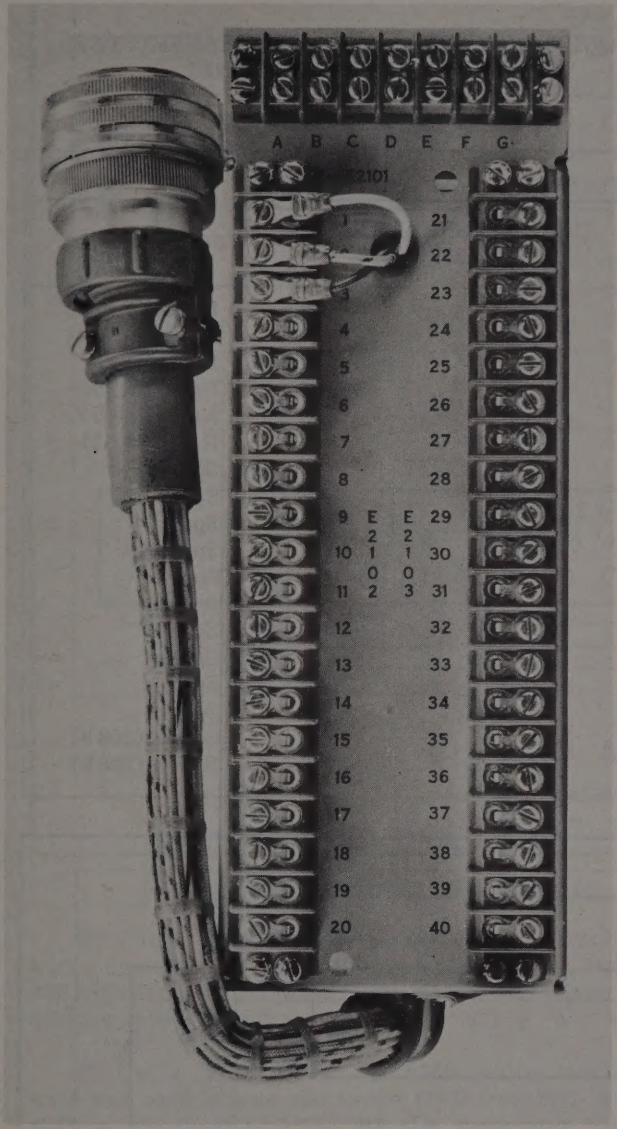


Figure 4-40. Special-Purpose Electrical Cable Assembly CX-2261/U

p. Make cable and wiring connections in rack No. 51 as follows:

(1) Make fourteen jumper connections with No. 18 AWG, red, insulated wire on each of the top left CX-2261/U cables (4201L, 4202L, 4203L, 4204L, and 4205L) as shown in Figures 4-39, 4-40, and 4-41. Before making these connections remove approximately 1/2-inch of insulation from the ends of each jumper, and tin the bare ends with solder.

(2) Make twelve jumper connections with No. 18 AWG, red, insulated wire on each of the top right CX-2261/U cables (4201R, 4202R, 4203R, 4204R, and 4205R) as shown in Figures 4-39, 4-40, and 4-42. Before making connections remove approximately half an inch of insulation from the ends of each jumper, and tin the bare ends with solder.

(3) Connect CX-2261/U cables 4201R through 4205R and 4201L through 4205L into the five top SB-270/FSA-4 control panels by means of the AN connectors on the CX-2261/U cables, as shown in Figures 4-39 and 4-40.

(4) Connect Cable Assembly CX-2262/U between Power Supply PP-1453/FSA-4 (rear of cabinet) and an a-c receptacle (side of cabinet) as shown in Figure 4-39. (Cable Assembly CX-2262/U is furnished with the power supply.)

(5) Cut a length of No. 14 AWG power cable that is long enough to connect between terminal board E901 on Power Supply PP-1453/FSA-4 and terminal board E4224, which is located on the right side of the rack as shown in Figure 4-39. Prepare both ends of the cable by removing approximately half an inch of insulation from the No. 14 AWG wires and tinning the bare conductors with solder. At terminal board E901 connect the white or color-coded wire to terminal No. 1 and the black or uncoded wire to terminal No. 3 (Fig. 4-39). At terminal board E4224 connect the white or color-coded wire to terminal No. 27 and the black or uncoded wire to terminal No. 24. Make sure that the metal jumper or a No. 12 AWG white wire is connected between terminals No. 1 and No. 2 of E901.

(6) Connect a length of No. 12 AWG white wire between terminal No. 2 on terminal board E901 and the rack ground stud (Fig. 4-39).

(7) Cut a length of No. 6 AWG bare copper wire, fasten one end to the rack ground stud (Fig. 4-39), and solder the other end to the ground bus in the cable trench.

q. At rack No. 50 cut a length of No. 6 AWG bare copper wire, attach one end to the rack ground stud (Fig. 4-13), and solder the other end to the ground bus in the cable trench.

r. As in step "q" above, connect the ground studs in rack No. 31 to the ground bus in the cable trench.

s. At rack No. 1 install a ground bus and ground the equipment as follows:

(1) Loosen a nut (ITEM S of Fig. 4-1) at the top and bottom of the left rear channel (ITEM D).

(2) Cut an 8-foot length of No. 6 AWG bare copper wire, and attach one end under the top nut (ITEM S) on the inside of the left rear channel. Tighten nut down firmly on the wire.

(3) Bend the wire out approximately one inch from the nut so that it will not lie on flat face of the channel.

(4) Run the wire down the inside of the rear channel, keeping it approximately one inch out from the flat face of the channel. Run it under the lower nut (ITEM S) and into the cable trench.

(5) Neatly arrange and form the wire inside the channel. Then tighten the lower nut down firmly on the wire.

(6) Solder the loose end of the wire to the ground bus in the cable trench.

(7) Cut a length of No. 12 AWG, white, insulated wire, remove insulation from one end, and connect to the GND terminal (wing nut) of T-282/GR transmitter No. 1. Remove insulation from the other end and solder to the No. 6 AWG rack ground bus that was installed on the rack in steps "s(1)" through "s(6)" above.

(8) As in step "s(7)," ground MD-141A/GR modulator No. 1 to the rack ground bus.

(9) As in steps "s(7)" and "s(8)" above, ground transmitter and modulator No. 2.

t. At rack No. 2 install a No. 6 AWG ground bus and ground T-282/GR transmitters No. 3 and No. 4 and MD-141A/GR modulators No. 3 and No. 4, as in steps "s(1)" through "s(9)."

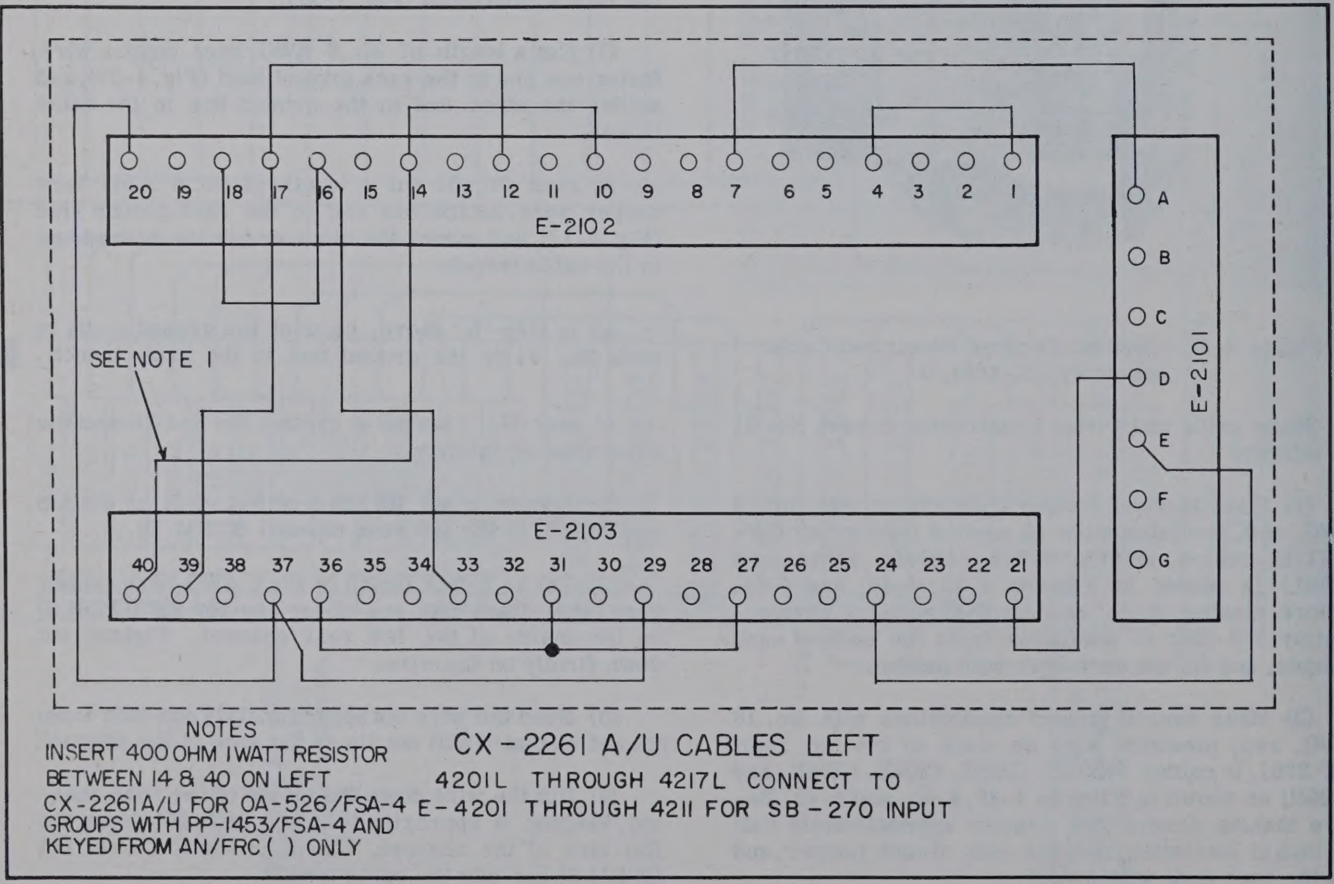
u. At rack No. 3 install a ground bus and ground the equipment as follows:

(1) Install a No. 6 AWG ground bus in rack No. 3 as described in steps "s(1)" through "s(6)."

TABLE 4-31

EQUIPMENT SCHEDULE FOR TRANSMITTER-BUILDING POWER PANEL

PANEL G	
CIRCUIT BREAKER (30 AMP)	EQUIPMENT
1	Rack No. 1
2	Rack No. 2
3	Rack No. 3
4	Rack No. 50
5	Rack No. 51
6	Rack No. 31
7	Spare
8	Spare
9	Spare
10	Spare
11	Spare
12	Spare
13	Spare
14	Spare
15	Spare
16	Spare
17	Spare (208V)
18	Spare (208V)



NOTES
INSERT 400 OHM 1 WATT RESISTOR BETWEEN 14 & 40 ON LEFT CX-2261A/U FOR OA-526/FSA-4 GROUPS WITH PP-1453/FSA-4 AND KEYED FROM AN/FRC ( ) ONLY

CX-2261 A/U CABLES LEFT 4201L THROUGH 4217L CONNECT TO E-4201 THROUGH 4211 FOR SB-270 INPUT

Figure 4-41. CX-2261/U Cables 4201L, 4202L, 4203L, 4204L, and 4205L—Jumper Connections

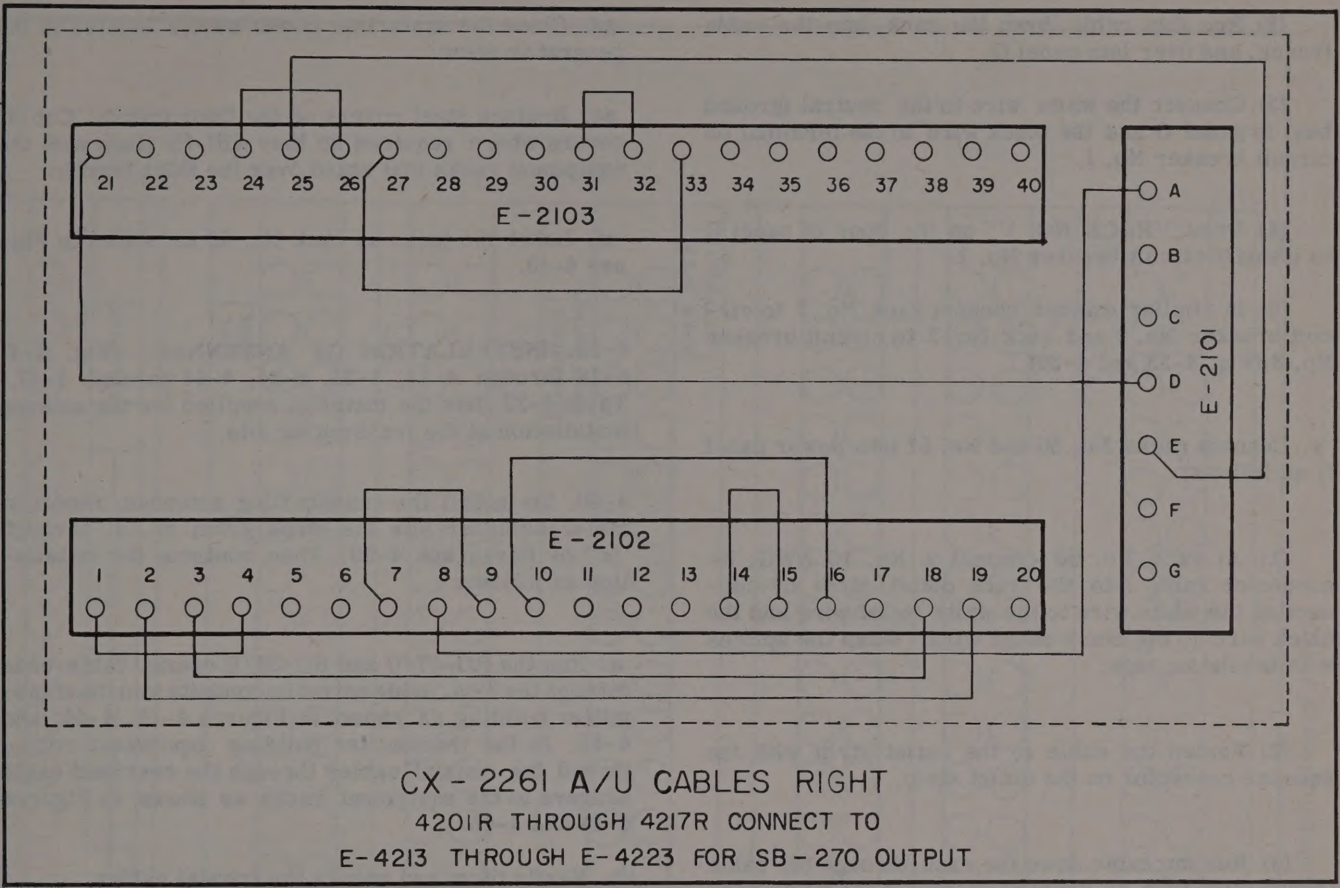


Figure 4-42. CX-2261/U Cables 4201R, 4202R, 4203R, 4204 R, and 4205R—Jumper Connections

(2) Cut a length of No. 12 AWG, white, insulated wire, connect one end to terminal No. 1 in the J-390/GR distribution panel (Fig. 4-35), and solder the other end to the rack ground bus.

(3) Cut a length of No. 12 AWG, white, insulated wire and connect one end to the GND terminal (wing-nut) on the front of MD-129A/GR modulator No. 5. Run the loose end through the 1-1/2 in. knockout hole in the MX-1174/U conduit, up the conduit, out through the metal grommet in the bottom of the conduit, and over to the rack ground bus. Solder it to the ground bus at this point.

WARNING

Be sure the main line power switch in the generator room is open before working at power distribution panel G.

v. Stencil the letters "PANEL G" in white on the power distribution panel that is located over the floor trench in the equipment room (Fig. 4-27 or 4-28). Remove the front cover of this panel and turn all circuit breakers to OFF.

w. Connect rack No. 31 into power panel G as follows (Table 4-31):

(1) Run a No. 10 AWG, 2-conductor cable from the floor trench, up through the bottom of rack No. 31, to terminal board E701 (Fig. 4-37). (Drill a 1-in. diameter hole in the bottom of this rack to accommodate the cable if required.)

(2) Connect the two wires to the 110/125V terminals on terminal board E701 (Fig. 4-37).

(3) Run the No. 10 AWG cable from rack No. 31, along the bottom of the cable trench, and over to panel G. Then pass it through a conduit up to the inside of panel G.

(4) Connect the white wire to the neutral (ground bus) in panel G.

(5) Connect the black wire to the terminal on circuit breaker No. 6.

(6) Print "RACK NO. 31" on the door of panel G to identify circuit breaker No. 6.

(7) In similar manner connect rack No. 32 to circuit breaker No. 7 and rack No. 33 to circuit breaker No. 8.

x. Connect racks No. 1, No. 2, and No. 3 into power panel G as follows:

(1) At rack No. 1 run a No. 10 AWG, 2-conductor cable into the J-390/GR distribution panel; connect the white wire to the NEUT terminal bar and the black wire to the 115V terminal bar (Fig. 4-33).

(2) Run this cable down the rack, into the cable trench, and over into panel G.

(3) Connect the white wire to the neutral (ground bus) in panel G and the black wire to the terminal on circuit breaker No. 1.

(4) Print "RACK NO. 1" on the door of panel G to identify circuit breaker No. 1.

(5) In similar manner connect rack No. 2 to circuit breaker No. 2 and rack No. 3 to circuit breaker No. 3 (Fig. 4-33 and 4-35).

y. Connect racks No. 50 and No. 51 into power panel G as follows:

(1) At rack No. 50 connect a No. 10 AWG, 2-conductor cable into the rack outlet strip by connecting the white wire to the white outlet wire and the black wire to the black outlet wire. Wrap the splices with insulation tape.

(2) Fasten the cable to the outlet strip with the squeeze connector on the outlet strip.

(3) Run the cable down the rack, through the cable trench, and over to panel G. Connect the white wire to the neutral (ground bus) and the black wire to circuit breaker No. 4.

(4) Print "RACK NO. 50" on the door of panel G to identify circuit breaker No. 4.

(5) In similar manner connect rack No. 51 to circuit breaker No. 5.

z. Bundle the power cables together in the cable trench and secure as required.

aa. Replace front cover and door on panel G.

ab. With No. 12 AWG, white, insulated wire, ground and strap together telephone terminal chambers No. 1 and No. 2 in telephone cabinet C, as shown in Figures 4-38 and 4-27 or 4-28.

ac. Test telephone pairs No. 1 through No. 51 in the telephone cable that connects terminal chamber E-6107 in rack No. 50 with the 51-pair terminal chamber No. 1 located in telephone cabinet C (Fig. 4-38). The terminals designated on terminal chamber E-6107 for each pair should be connected to the corresponding terminals of terminal chamber No. 1 in cabinet C. For example, the left and right terminals of pair No. 1 on E-6107 must be connected to the left and right terminals of pair No. 1 on terminal chamber No. 1 in cabinet C.

ad. Close the main line power switch located in the generator room.

ae. Replace steel covers on the floor trench. Cut off covers where required so they will fit flush with the equipment racks that stand over the floor trench.

af. Label the jacks in rack No. 50 as shown in Figure 4-43.

4-39. INSTALLATION OF ANTENNAS. (Fig. 4-2, 4-18 through 4-24, 4-32, 4-34, 4-44 through 4-47.) Table 4-32 lists the material supplied for the antenna installation at the transmitter site.

4-40. To install the transmitting antennas, repeat at the transmitter site the steps given in "a" through "z" of Paragraph 4-29. Then continue the installation as follows:

a. Run the RG-17/U and RG-34/U coaxial cable-ends through the 3-in. cable entrance conduits into the transmitter building as shown in Figures 4-18, 4-44, and 4-45. In the transmitter building equipment room, thread the coaxial cables through the overhead cable hangers to the equipment racks as shown in Figures 4-44 and 4-45.

b. Neatly form and secure the coaxial cables.

c. Connect plug UG-94 to antenna cable as shown in Figure 4-47.

d. Thread the antenna cable assembly with the UG-94 plug into rack No. 31 through the entrance hole located above the rear door of the rack. Connect the plug to the antenna connector on the rear of the Amplifier Panel PN-8-C.

(1) and (2) (Deleted)

e. (Deleted)

(1) thru (3) (Deleted)

f. (Deleted)

g. Connect antenna cables into rack No. 1 as follows:

(1) Run antenna cable No. 1 down to the CG-707/U cable assembly attached to the rear of T-282/GR transmitter No. 1, and cut it off (Fig. 4-45 and 4-32).

(2) Install a UG-495/U connector plug to the end of cable No. 1 in accordance with Figure 4-23.

(3) Connect the UG-495/U connector plug into the CG-707/U cable assembly.

(4) In similar manner, connect antenna cable No. 2 into T-282/GR transmitter No. 2.

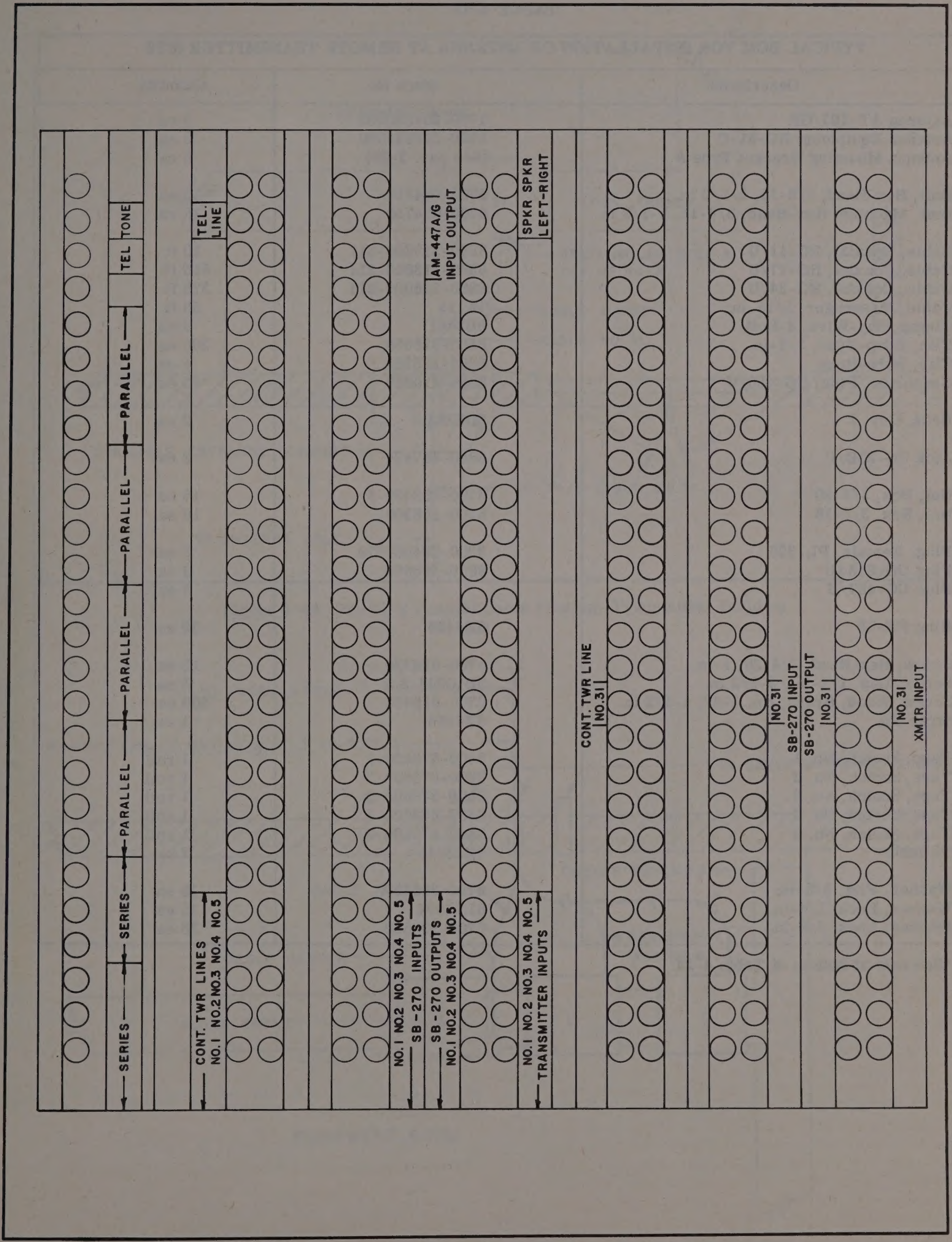

SERIES
SERIES
PARALLEL
PARALLEL
PARALLEL
PARALLEL
TEL
TONE
TEL.
LINE
CONT. TWR LINES
NO.1 NO.2 NO.3 NO.4 NO.5
NO.1 NO.2 NO.3 NO.4 NO.5
SB-270 INPUTS
SB-270 OUTPUTS
NO.1 NO.2 NO.3 NO.4 NO.5
AM-447A/G
INPUT OUTPUT
NO.1 NO.2 NO.3 NO.4 NO.5
TRANSMITTER INPUTS
SPKR SPKR
LEFT-RIGHT
CONT. TWR LINE
NO.31
NO.31
SB-270 INPUT
SB-270 OUTPUT
NO.31
NO.31
XMTR INPUT

Figure 4-43. Rack No. 50—Identification of Jacks

TABLE 4-32

TYPICAL BOM FOR INSTALLATION OF ANTENNA AT REMOTE TRANSMITTER SITE

Description	Stock No.	Quantity
Antenna AT-197/GR	1700-201020803	5 ea
Antenna Equipment RC-81-C	1700-202634000	3 ea
Antenna Mounting Bracket Type A	(See par. 3-76)	8 ea
Bolt, Hex-Head, 3/8-16, 1-1/2 in.	6700-054110	12 ea
Bolt, Machine, Hex-Head, 3/8-16, 5-1/2 in.	6700-054750	16 ea
Cable, Coaxial, RG-11/U	8860-337600-211	10 ft
Cable, Coaxial, RG-17/U	8860-313600-211	615 ft
Cable, Coaxial, RG-34/U	8860-328000-211	375 ft
Cable, Messenger, 5/16-in.	1A115	50 ft
Clamp, Guy-Wire, 3-Bolt	5B3461	4 ea
Clip, Loop-Type, 3/4-in.	6500-326650	300 ea
Clip, Wire-Rope	6700-195200	4 ea
Connector, Plug, UG-495/U	8850-470035	10 ea
Hook, Guy, J	5B5283.5	2 ea
Jack UG-23B/U	8850-467474	3 ea
Nut, Hex, 1/4-20	6700-353499-5	15 ea
Nut, Hex, 3/8-16	6700-356300	16 ea
Plug, Female, PL-306	3300-294087070	3 ea
Plug UG-94A/U	8850-468669	3 ea
Plug UG-487/U		3 ea
Ring PF-69	5B9456	30 ea
Screw, Hex-Head, 1/4-20, 1-in.	6700-625720	15 ea
Screw, Lag, 1/2-in., 3-1/2 in.	5B10008-3.5	2 ea
Screw, Wood, Brass, No. 6-32, 1-1/2 in.	6700-815400	600 ea
*Strap Kit	6Z8565	1 ea
Tape, Scotch, No. 1	8800-873600-1	1 roll
Tape, Scotch, No. 2	8800-873600-2	1 roll
Tape, Scotch, No. 3	8800-873600-3	1 roll
Tape, Scotch, No. 4	8800-873600-4	1 roll
Tape, Scotch, No. 5	8800-873600-5	1 roll
Thimble	5B18045	2 ea
Washer, Flat, 3/8-in.	6700-356150	16 ea
Washer, Lock, 1/4-in.	6L71004	15 ea
Washer, Lock, 3/8-in.	6700-990550	28 ea

*See note at bottom of Table 4-24.

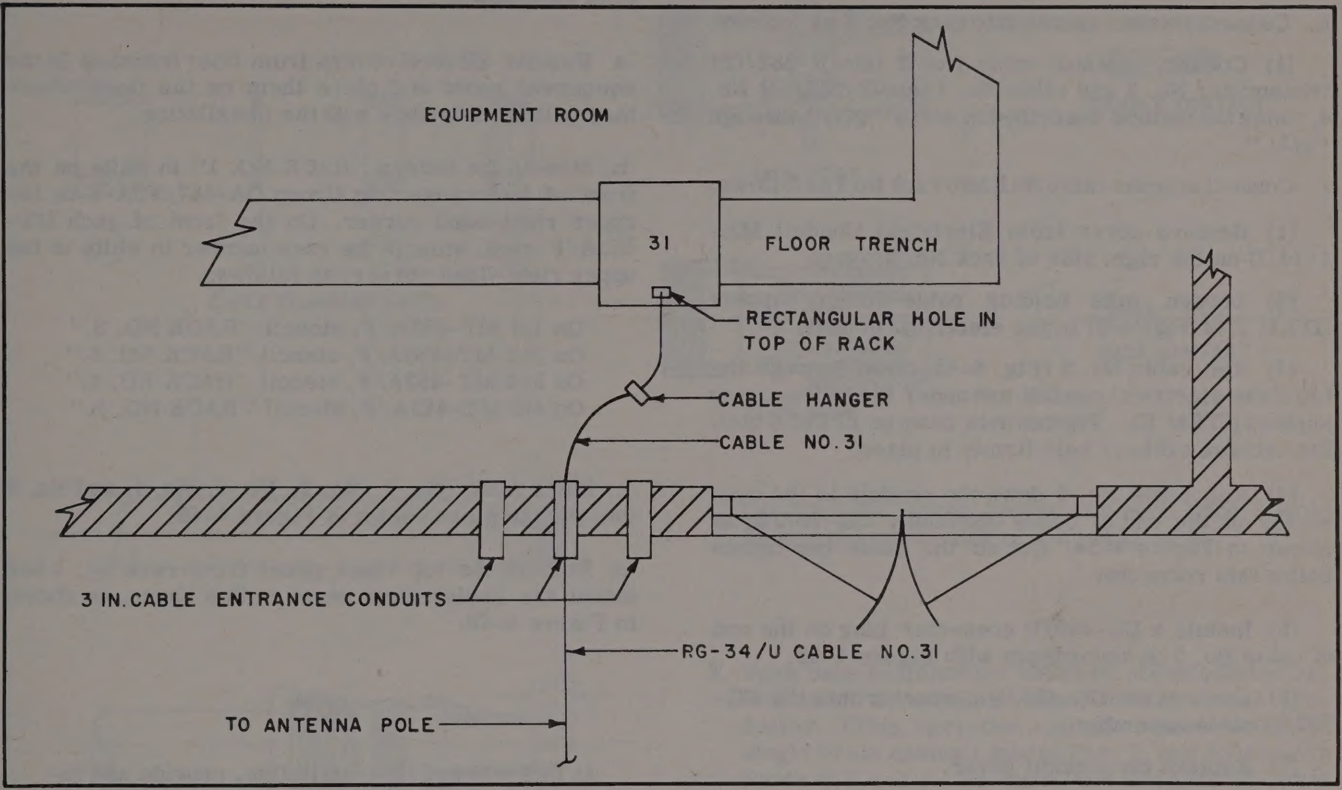

EQUIPMENT ROOM
31
FLOOR TRENCH
RECTANGULAR HOLE IN TOP OF RACK
CABLE HANGER
CABLE NO. 31
3 IN. CABLE ENTRANCE CONDUITS
RG-34/U CABLE NO. 31
TO ANTENNA POLE

Figure 4-44. RG-34/U Coaxial Cable Routing—Transmitter Building

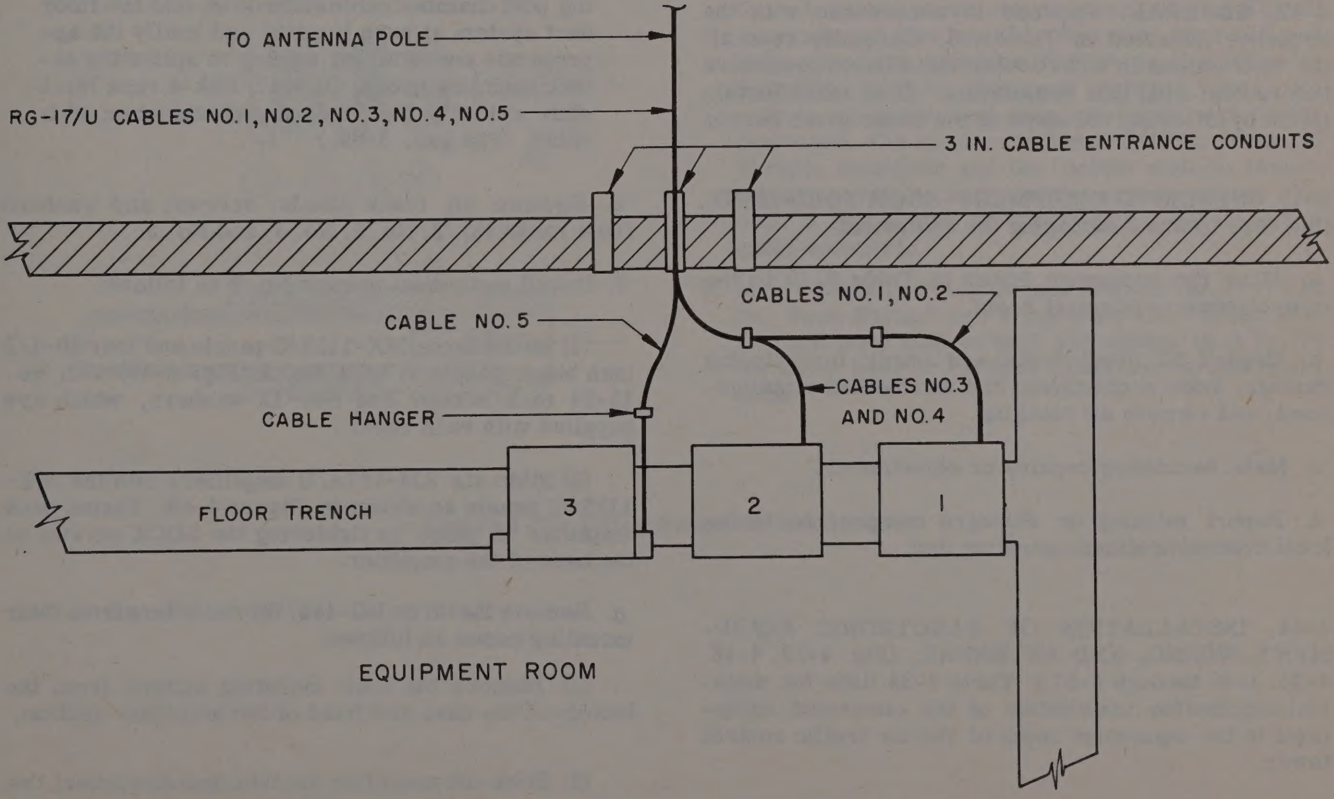

TO ANTENNA POLE
RG-17/U CABLES NO. 1, NO. 2, NO. 3, NO. 4, NO. 5
3 IN. CABLE ENTRANCE CONDUITS
CABLES NO. 1, NO. 2
CABLE NO. 5
CABLES NO. 3 AND NO. 4
CABLE HANGER
FLOOR TRENCH
3
2
1
EQUIPMENT ROOM

Figure 4-45. RG-17/U Coaxial Cable Routing—Transmitter Building

Figure 4-46. (Deleted)

h. Connect antenna cables into rack No. 2 as follows:

(1) Connect antenna cable No. 3 into R-282/GR transmitter No. 3 and cable No. 4 into T-282/GR No. 4, using the method described in steps "g(1)" through "g(3)."

i. Connect antenna cable No. 5 into rack No. 3 as follows:

(1) Remove cover from Electrical Conduit MX-1174/U on the right side of rack No. 3.

(2) Loosen nuts holding cable-clamp support (ITEM E of Fig. 4-2) in the electrical conduit.

(3) Run cable No. 5 (Fig 4-45) down through the top of the electrical conduit and under the cable-clamp support (ITEM E). Tighten nuts down on ITEM E until the antenna cable is held firmly in place.

(4) Run cable No. 5 down the conduit to the connector on the end of Cable Assembly CG-707/U, as shown in Figure 4-34. Cut off the cable two inches below this connector.

(5) Install a UG-495/U connector plug on the end of cable No. 5 in accordance with Figure 4-23.

(6) Connect the UG-495/U connector into the CG-707/U cable assembly.

(7) Replace the conduit cover.

4-41. INSTALLATION IN AIR-TRAFFIC-CONTROL-TOWER EQUIPMENT ROOM.

4-42. GENERAL. Proceed in accordance with the sequence indicated in Table 4-3. Carefully read all the instructions in a particular installation procedure before beginning that installation. Then make installation by following the steps in the order given herein.

4-43. UNPACKING EQUIPMENT-ROOM EQUIPMENT. Use care to avoid damaging the equipment.

a. Move the equipment listed in Table 4-10 to the control-tower equipment room.

b. Unpack all components and check for shipping damage, loose connections, and mechanical misalignment, and remove all blocking.

c. Make necessary repairs or adjustments.

d. Report missing or damaged components to the local communications operating unit.

4-44. INSTALLATION OF ELECTRONIC EQUIPMENT, WIRING, AND ANTENNAS. (Fig. 4-13, 4-16, 4-24, 4-48 through 4-61.) Table 4-33 lists the material supplied for installation of the electronic equipment in the equipment room of the air traffic control tower.

4-45. To install the electronic equipment, wiring, and antennas in the control-tower equipment room, proceed as follows:

a. Remove all steel covers from floor trenches in the equipment room and place them on the floor where they will not interfere with the installation.

b. Stencil the letters "RACK NO. 1" in white on the front of Interconnecting Group OA-447/FSA-4 in the upper right-hand corner. On the front of each MT-453A/F rack, stencil the rack number in white in the upper right-hand corner, as follows:

On 1st MT-453A/F, stencil "RACK NO. 2."
On 2nd MT-453A/F, stencil "RACK NO. 3."
On 3rd MT-453A/F, stencil "RACK NO. 4."
On 4th MT-453A/F, stencil "RACK NO. 5."

c. Move racks No. 1, No. 2, No. 3, No. 4, and No. 5 into the positions shown in Figure 4-48.

d. Remove the top blank panel from rack No. 1 and mount the loudspeaker panel in this space, as shown in Figure 4-49.

NOTE

At this stage of the installation, provide and install one 51 pair binding post chamber, cable terminal TA-93/FT, Signal Corps Stock Number SC-560-51H, in each of cabinets A, C and D, for cross-connection purposes. Run the binding post chamber cable stubs down into the floor duct system at each location and notify the appropriate construction agency to splice the interconnecting group, OA-447/FSA-4 rack No. 1 stub cable to the binding post chamber stub cable. (See par. 3-69.)

e. Remove all blank panels, screws, and washers from racks No. 2, No. 3, No. 4, and No. 5.

f. Install equipment in rack No. 2 as follows:

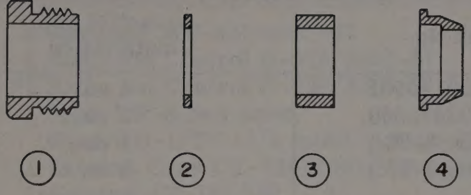
(1) Mount three MX-1125/G panels and four 10-1/2 inch black panels in rack No. 2 (Fig. 4-49) with No. 12-24 rack screws and No. 12 washers, which are supplied with each rack.

(2) Slide six AM-447A/G amplifiers into the MX-1125/G panels as shown in Figure 4-49. Fasten each amplifier in place by tightening the LOCK screws on the base of the amplifier.

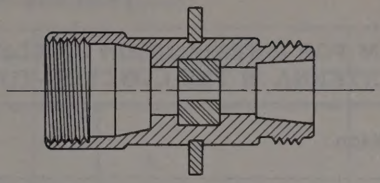
g. Remove the three RD-142/UN recorders from their mounting cases as follows:

(1) Remove the four mounting screws from the bottom of the case and front of the amplifier section.

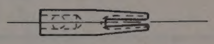
(2) Slide out amplifier section, and disconnect two cables running from amplifier section to recording head in amplifier.



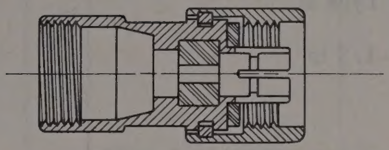
CABLE CLAMPING PARTS



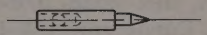
JACK BODY



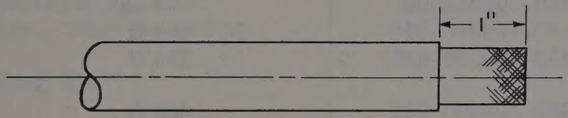
FEMALE CONTACT



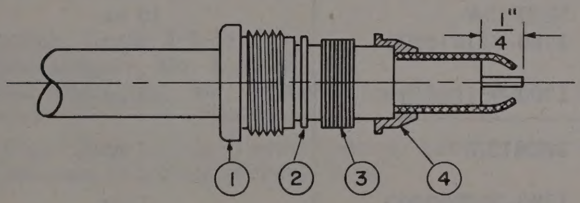
PLUG BODY



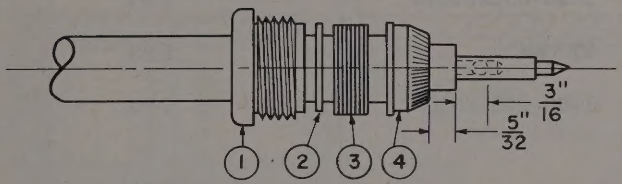
MALE CONTACT



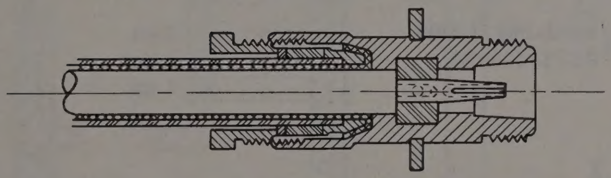
1. Cut Vinylite jacket square and even back 1 inch. Be careful not to nick or cut braid wires.



2. Push back braid and cut off 1/4 in. of cable dielectric. Pull braid forward and taper toward center conductor. (This operation may not be necessary for single braid cables.) Insert Part 1, and follow with Parts 2, 3, and 4. Be sure Part 4 clears all braid wires and its internal shoulder rests squarely against end of Vinylite jacket.



3. Unbraid shield wires, spread open and lay back on Part 4 without wires crossing each other. Cut off excess braid wire length so that each wire will end before touching shoulder of Part 4. Cut off cable dielectric 5/32 in. from end of braid wires. Be sure to cut square and even and do not nick center conductor. Cut center conductor 3/16 in. from end of cable dielectric and tin. Solder male or female contact carefully and remove excess solder. Be careful that solder or flux does not get on end of cable dielectric.



4. Insert cable into plug or jack body as far as it will go. Push Parts 3 and 2 into body and tighten Part 1. Hold body with wrench and tighten Part 1. Do not allow body or cable to rotate during this operation.

Figure 4-47. Cable Assembly Instructions

TABLE-4-33

TYPICAL BOM FOR INSTALLATION OF ELECTRONICS EQUIPMENT, WIRING, AND ANTENNA IN THE CONTROL-TOWER EQUIPMENT ROOM

Description	Stock No.	Quantity per Installation
Amplifier AM-447A/G	1790-050140501	8 ea
Antenna AN-188	1700-202470560	1 ea
Antenna Mounting Bracket Type A	(See par. 3-76.)	1 ea
Antenna Mounting Bracket Type B	(See par. 3-76.)	1 ea
Bolt, Hex-Head, 3/8-16, 1-1/2 in.	6700-054110	8 ea
Box Connector, 1/2-in.	8800-038200	4 ea
Braid, Wire, 1/2-in.	8860-050000-825	15 ft
Cable Assembly, Power, CD-809	1700-321859500	1 ea
Cable Assembly CD-1333	1700-322971538	1 ea
Cable Assembly, Power	1760-322758000	4 ea
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	150 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	325 ft
Cable, Special-Purpose, 2-Cond., No. 22 AWG (Red, Black)	8860-398000-211	200 ft
Case CS-80-A	2Z1880A	1 ea
Control, Radio, BC-1312	1700-211781580	1 ea
Cord, W.E. Co. No. 3P7D, 2 ft	3E3P7D	16 ea
Cord, W.E. Co. No. 3P15A, 6 ft	3E3P15A	16 ea
Cord, Headset, CD-307	1790-321018000	1 ea
Demagnetizer MX-1373/UN	1790-051256100	1 ea
Fuse, 15-Amp, 125V	3Z2615.3	4 ea
Headset HS-33	1790-207600000	1 ea
Interconnecting Group OA-447/FSA-4	1790-052261010	1 ea
Loudspeaker Panel Assembly	2Z6380	1 ea
Mounting N91002 (FT-314A)	1700-293185500	1 ea
Panel, Blank, Lacquered Steel, 19'' x 12-1/4'' x 1/8'', Bud Radio PS-1256		4 ea
Panel MX-1125/G	1790-053122002	4 ea
Rack FT-244-A	1600-294712000	1 ea
Rack MT-453A/F	2Z7383-453A	4 ea
Radio Set AN/GRC-32B, consisting of:		1 ea
1 Cabinet CY-1287/GRC (not used)		
1 Receiver-Transmitter RT-178/ARC-27		
1 Cabinet CY-1191/GRC-32A (not used)		
1 Power Supply PP-894/GRC-32B		
1 Cable Assembly CX-2007A/U		
1 Cabinet CY-1288/GRC (not used)		
1 Cable Assembly CX-2053/U		
1 Cable Assembly CX-2054/U		
1 Cable Assembly CX-2163/U		
1 Control Unit RM-52 (not used)		
1 Control Unit RM-53 (not used)		
*1 Cord CD-307A		
*1 Headset HS-33A		
1 Interconnecting Box J-499/GRC		
1 Loudspeaker LS-166 (not used)		
*1 Microphone T-17		

TABLE 4-33—Continued

Description	Stock No.	Quantity per Installation
1 Mounting MT-821/ARC-27		
1 Radio Set Control C-626/ARC-27		
*1 Radio Set Control C-628/ARC-27		
1 Sppol DR-8 (not used)		
Wire WD-1/TT (1/4 mile) (not used)		
1 Antenna Case CY-728/GRC (not used)		
1 Antenna AT-197/GR		
1 Cable Assembly CG-690/U		
1 Cable Assembly CG-895/U		
1 Bag, Antenna Mounting Hardware		
Receiver, Radio, BC-624-C	1600-217242100	1 ea
Recorder RD-115/UN	1790-053560020	3 ea
Rectifier RA-62-C	1700-371085000	1 ea
Reel, Tape Recording	1790-053560510	4 ea
**Strap Kit	2Z8565	1 ea
Tape, Recording	8700-NSL4653	24 rolls
Transmitter, Radio, BC-625-AM	1600-222006600	1 ea
Twistlock, Single, AC connectors		2 ea
Washer, Lock, 3/8-in.	6700-990550	8 ea
Wire, Copper, No. 6 AWG S.D.	1A806.9	30 ft
Wire, Electrical, No. 12 AWG, Insulated, White		

*Place these items in control-tower cab for later installation.
**See note at bottom of Table 4-24.

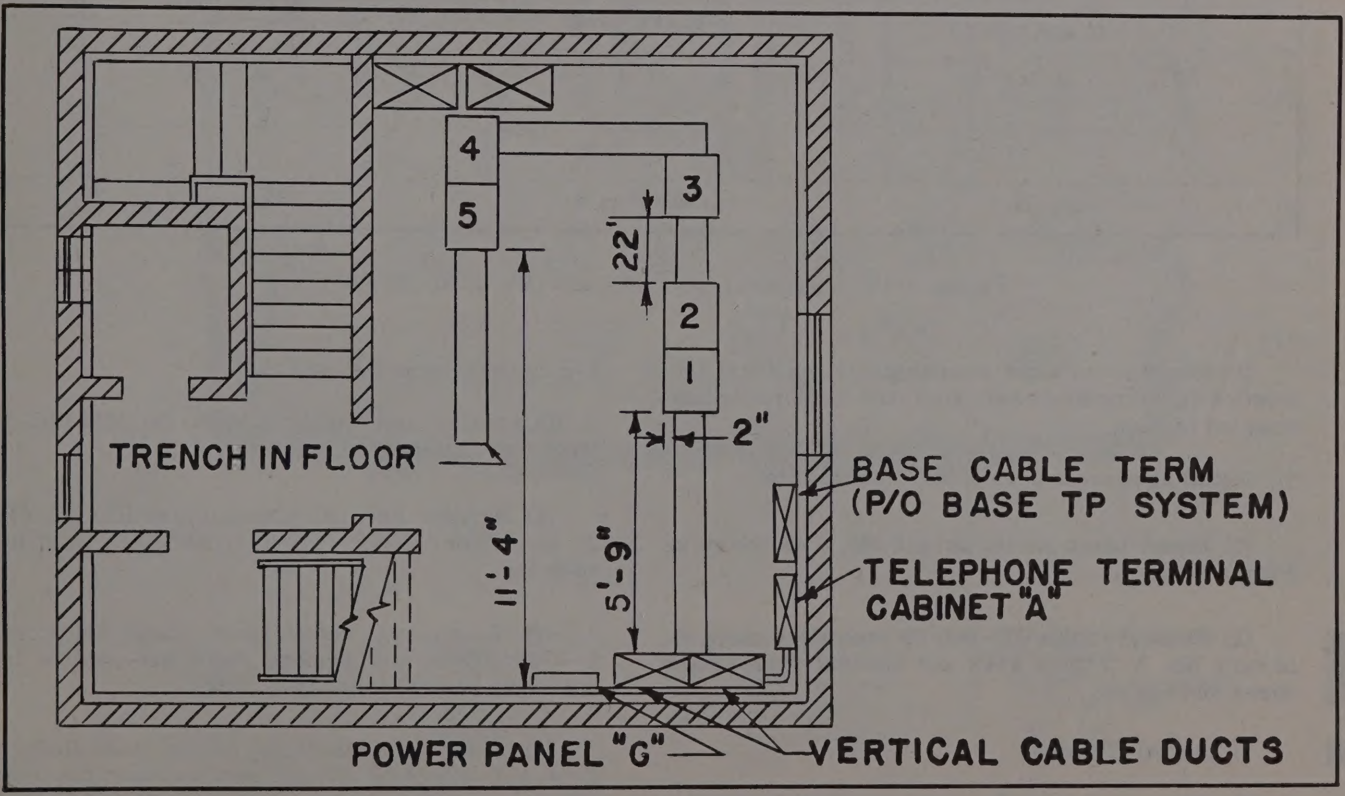

4
5
3
22'
2
1
2"
11'-4"
5'-9"
TRENCH IN FLOOR
BASE CABLE TERM (P/O BASE TP SYSTEM)
TELEPHONE TERMINAL CABINET "A"
POWER PANEL "G"
VERTICAL CABLE DUCTS

Figure 4-48. Control-Tower Equipment Room—Equipment Layout

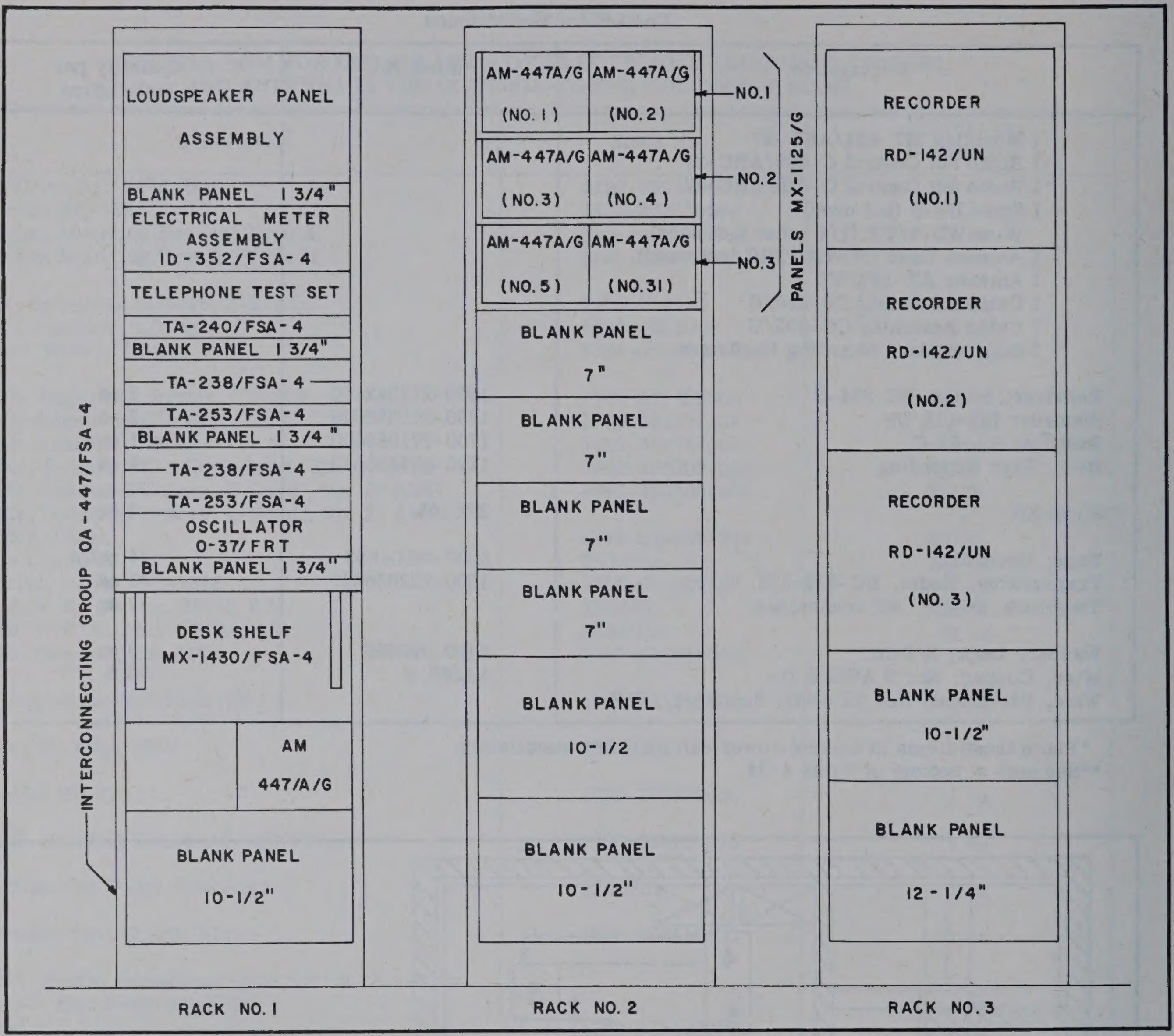

LOUDSPEAKER PANEL ASSEMBLY
BLANK PANEL 1 3/4"
ELECTRICAL METER ASSEMBLY ID-352/FSA-4
TELEPHONE TEST SET
TA-240/FSA-4
BLANK PANEL 1 3/4"
TA-238/FSA-4
TA-253/FSA-4
BLANK PANEL 1 3/4"
TA-238/FSA-4
TA-253/FSA-4
OSCILLATOR O-37/FRT
BLANK PANEL 1 3/4"
DESK SHELF MX-1430/FSA-4
AM 447/A/G
BLANK PANEL 10-1/2"
INTERCONNECTING GROUP OA-447/FSA-4
RACK NO. 1
AM-447A/G (NO. 1)
AM-447A/G (NO. 2)
AM-447A/G (NO. 3)
AM-447A/G (NO. 4)
AM-447A/G (NO. 5)
AM-447A/G (NO. 31)
NO. 1
NO. 2
NO. 3
PANELS MX-1125/G
BLANK PANEL 7"
BLANK PANEL 7"
BLANK PANEL 7"
BLANK PANEL 7"
BLANK PANEL 10-1/2
BLANK PANEL 10-1/2"
RACK NO. 2
RECORDER RD-142/UN (NO. 1)
RECORDER RD-142/UN (NO. 2)
RECORDER RD-142/UN (NO. 3)
BLANK PANEL 10-1/2"
BLANK PANEL 12-1/4"
RACK NO. 3

Figure 4-49. Equipment Layout—Racks No. 1, No. 2, and No. 3

(3) Remove the eight mounting screws from the front of the recording head panel, and slide recording head out of case.

h. Install equipment in rack No. 3 as follows:

(1) Mount blank panels in rack No. 3 as shown in Figure 4-49.

(2) Mount available RD-142/UN recorders as shown in rack No. 3, Figure 4-49 and connect appropriate wires and cables.

(3) and (4) (Deleted)

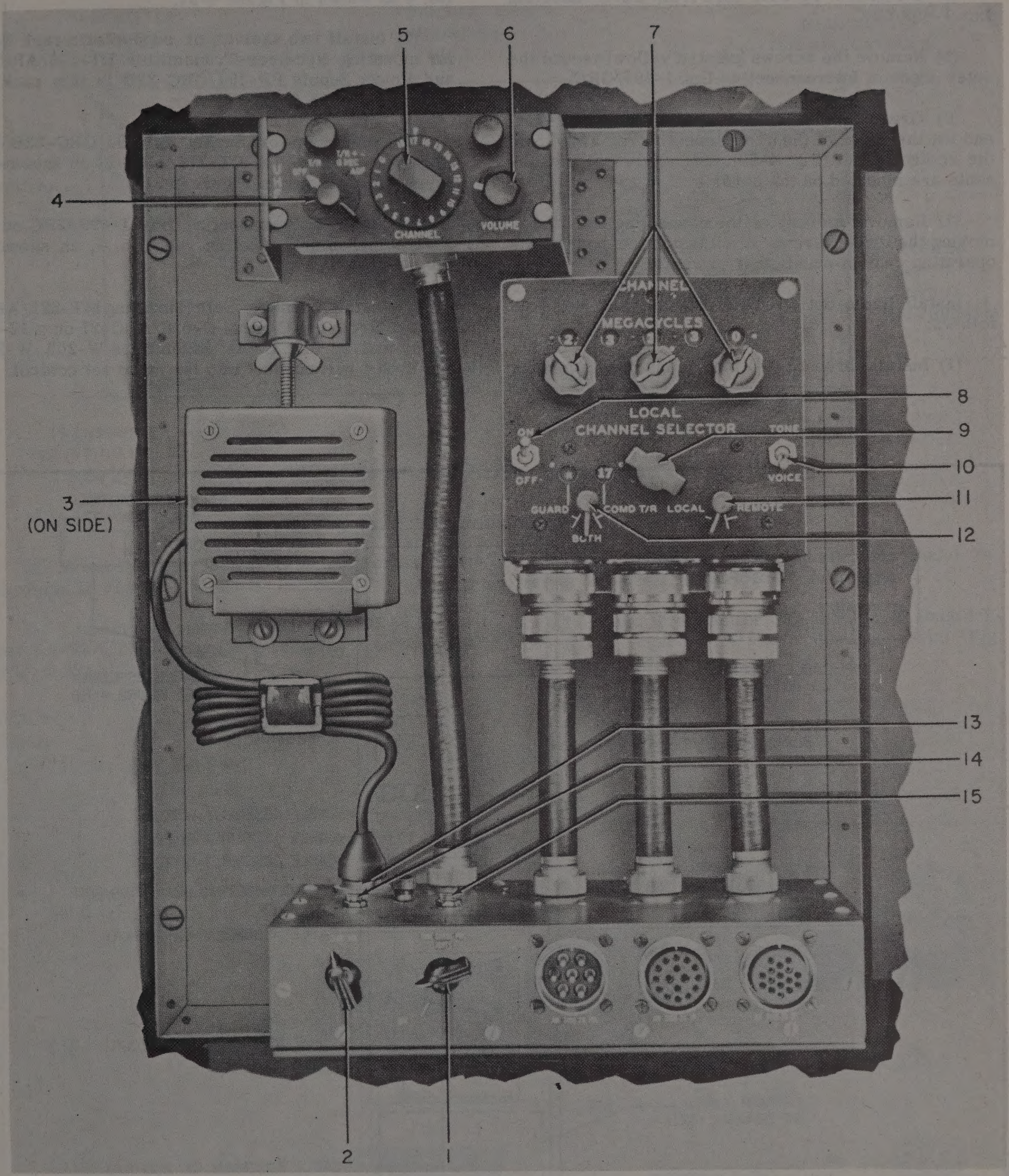
(5) Plug an a-c power cable (provided with the recorder) into each of the three recorders and into an a-c receptacle on the rack.

i. Remove the components of Radio Set AN/GRC-32B from their cabinets as follows:

(1) Remove Receiver-Transmitter RT-178/ARC-27 and Power Supply PP-894/GRC-32B from their cabinets.

(2) Disconnect cable from Radio Set Control C-628/ARC-27 and remove radio set control from operating control panel (Fig. 4-50).

(3) Disconnect the three cables from Radio Set Control C-626/ARC-27, and remove radio set control and its mounting plate (Mounting MT-821/ARC-27) from operating control panel (Fig. 4-50).


5
6
7
4
CHANNEL
VOLUME
CHANNEL
MEGACYCLES
8
LOCAL
CHANNEL SELECTOR
ON
OFF
TONE
VOICE
9
10
17
3
(ON SIDE)
GUARD
COMD T/R
LOCAL
REMOTE
BOTH
11
12
13
14
15
2
1

1. Remote Control Panel-Light Dimmer
2. "SPKR VOL" Control
3. Loudspeaker Switch
4. "OFF-T/R-T/R+G REC-ADF" Switch
5. "CHANNEL" Selector Switch
6. "VOLUME" Control
7. Frequency Selector Switches ("MEGACYCLES")
8. "ON-OFF" Switch
9. "LOCAL CHANNEL SELECTOR" Switch
10. "TONE-VOICE" Switch
11. "LOCAL-REMOTE" Switch
12. "GUARD-BOTH-COMD T/R" Switch
13. "SPEAKER" Receptacle
14. "PHONES" Jack
15. "MIC" Jack

Figure 4-50. Operating Control Panel—Radio Set AN/GRC-32B

(4) Disconnect speaker cord from Interconnecting Box J-499/GRC.

(5) Remove the screws (painted yellow) around the outer edges of Interconnecting Box J-499/GRC.

(6) Grasp Cable Assemblies W-201 and W-204, and lift the cover of the interconnecting box away from the control panel (Fig. 4-50). All electrical components are mounted on the cover.

(7) Remove the body of the connecting box by removing the three screws which fasten the body to the operating control panel shelf.

j. Install Radio Set AN/GRC-32B in rack No. 4 as follows:

(1) Install three 12-1/4 inch blank panels in rack No. 4 as shown in Figure 4-51.

(2) Install two shelves or supports in rack No. 4 for mounting Receiver-Transmitter RT-178/ARC-27 and Power Supply PP-894/GRC-32B in this rack, as shown in Figure 4-51.

(3) Mount Power Supply PP-894/GRC-32B and Receiver-Transmitter RT-178/ARC-27 on shelves or supports, as shown in Figure 4-51.

(4) Mount Interconnecting Box J-499/GRC on the 12-1/4 inch blank panel in rack No. 4, as shown in Figure 4-51.

(5) Install mounting plate (Mounting MT-821/ARC-27) and Radio Set Control C-626/ARC-27 on a 12-1/4 inch panel so that Cable Assemblies W-202, W-203, and W-204 will connect into the radio set control.

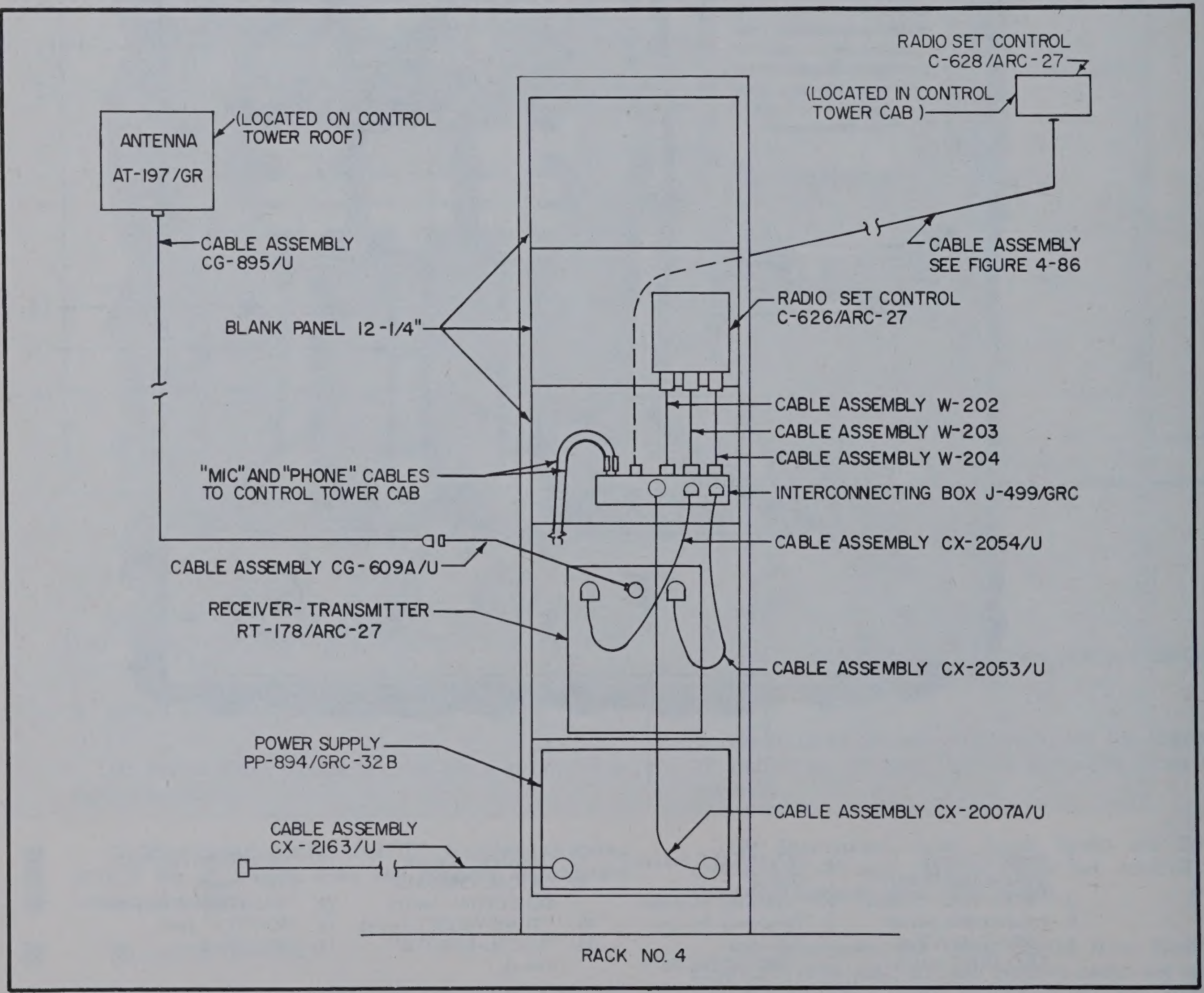
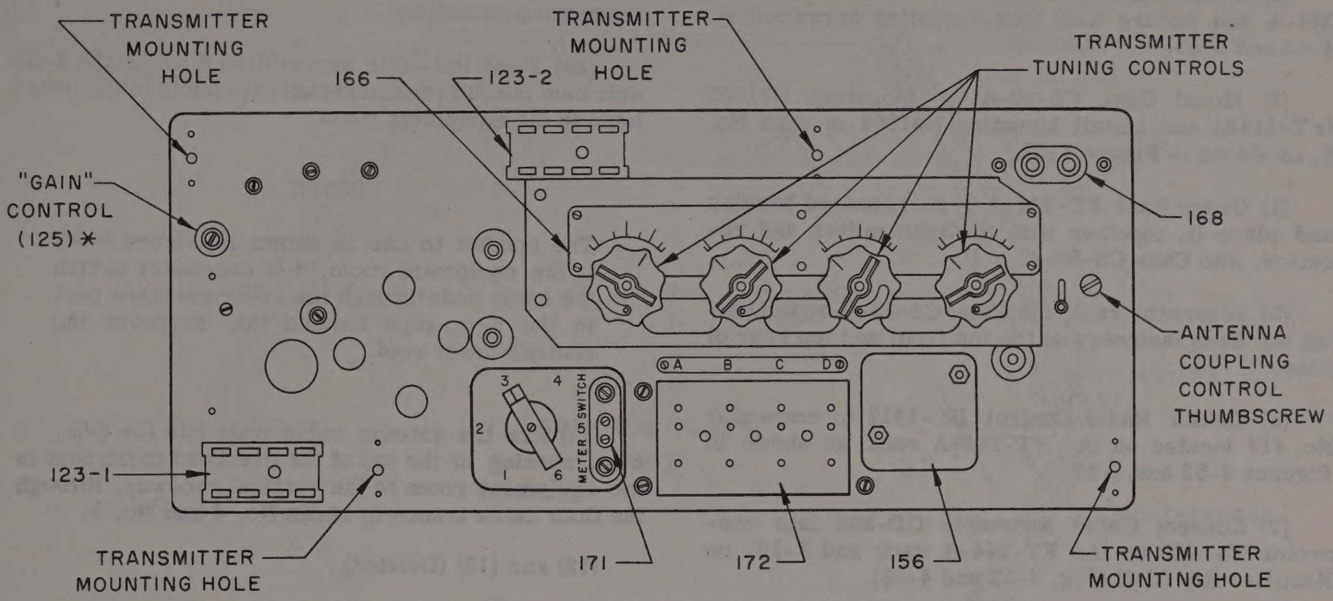

RADIO SET CONTROL
C-628/ARC-27
(LOCATED IN CONTROL TOWER CAB)
ANTENNA
AT-197/GR
(LOCATED ON CONTROL TOWER ROOF)
CABLE ASSEMBLY CG-895/U
CABLE ASSEMBLY SEE FIGURE 4-86
RADIO SET CONTROL C-626/ARC-27
BLANK PANEL 12-1/4"
CABLE ASSEMBLY W-202
CABLE ASSEMBLY W-203
CABLE ASSEMBLY W-204
"MIC" AND "PHONE" CABLES TO CONTROL TOWER CAB
INTERCONNECTING BOX J-499/GRC
CABLE ASSEMBLY CX-2054/U
CABLE ASSEMBLY CG-609A/U
RECEIVER-TRANSMITTER RT-178/ARC-27
CABLE ASSEMBLY CX-2053/U
POWER SUPPLY PP-894/GRC-32B
CABLE ASSEMBLY CX-2007A/U
CABLE ASSEMBLY CX-2163/U
RACK NO. 4

Figure 4-51. Installation of Radio Set AN/GRC-32B in Rack No. 4, Schematic Arrangement


TRANSMITTER MOUNTING HOLE
166
123-2
TRANSMITTER MOUNTING HOLE
TRANSMITTER TUNING CONTROLS
"GAIN" CONTROL (125) *
168
3
4
2
1
6
METER SWITCH
A
B
C
D
ANTENNA COUPLING CONTROL THUMBSCREW
123-1
TRANSMITTER MOUNTING HOLE
171
172
156
TRANSMITTER MOUNTING HOLE

*REPLACED BY A FIXED ATTENUATOR IN SOME RADIO TRANSMITTERS BC-625-AM

Figure 4-54. Transmitter BC-625-AM, Top View

(2) Mount Rectifier RA-62-C on shelf or support, as shown in Figure 4-52.

(3) Connect a-c power cable into J-102 on Rectifier RA-62-C and into an a-c receptacle on the rack (Fig. 4-52).

l. Install Transmitter BC-625-AM and Radio Receiver BC-624-C in rack No. 5 as follows:

(1) Mount Transmitter BC-625-AM in Rack FT-244-A and secure with four mounting screws (Fig. 4-53 and 4-54).

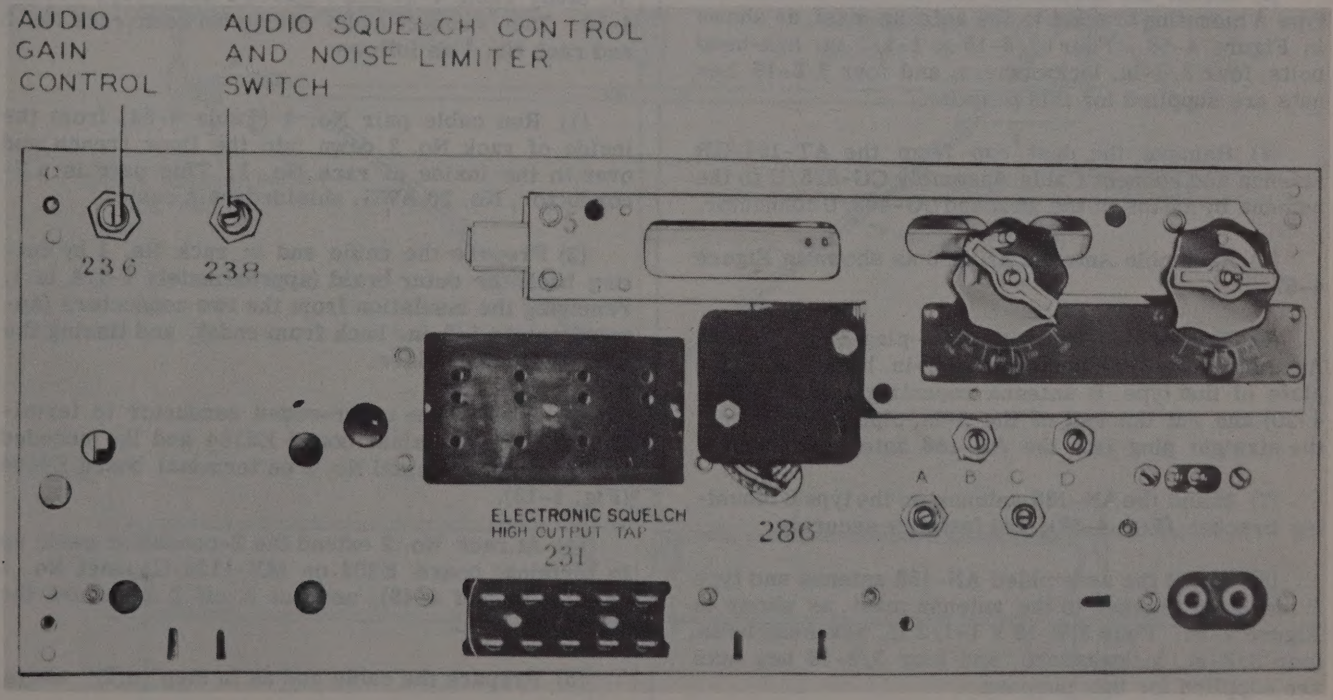

AUDIO GAIN CONTROL
AUDIO SQUELCH CONTROL AND NOISE LIMITER SWITCH
236
238
ELECTRONIC SQUELCH HIGH OUTPUT TAP
231
286
A
B
C
D

Figure 4-55. Radio Receiver BC-624-C, Top View

(2) Mount Radio Receiver BC-624-C in Rack FT-244-A and secure with four mounting screws (Fig. 4-53 and 4-55).

(3) Mount Case CS-80-A on Mounting N91002 (FT-314A) and install Mounting N91002 in rack No. 5, as shown in Figure 4-52.

(4) Grasp Rack FT-244-A by the recessed handles and place it, together with the transmitter and receiver, into Case CS-80-A.

(5) Secure the rack into Case CS-80-A by tightening the Dzus fasteners at the top front and top rear of case.

(6) Install Radio Control BC-1312 to connector No. 417 located on the FT-244-A rack, as shown in Figures 4-52 and 4-53.

(7) Connect Cable Assembly CD-809 into connector No. 420 on the FT-244-A rack and J-101 on Rectifier RA-62-C (Fig. 4-52 and 4-53).

m. Install Antenna AT-197/GR and Antenna AN-188 on the control-tower roof as follows:

(1) Assemble the AT-197/GR antenna as shown in Figure 4-24.

(2) Bolt the AT-197/GR antenna mounting base to the type A antenna mounting bracket shown in Figure 4-20, using three bolts supplied with the antenna.

(3) Mount the assembled AT-197/GR antenna and type A mounting bracket to the antenna mast, as shown in Figure 4-56. Four 3/8-16 x 1-1/2 in. hex-head bolts, four 3/8-in. lockwashers, and four 3/8-16 hex nuts are supplied for this purpose.

(4) Remove the dust cap from the AT-197/GR antenna and connect Cable Assembly CG-895/U to the antenna by means of the attached UG-495/U connector.

(5) Assemble Antenna AN-188 as shown in Figure 4-57.

(6) Thread the small straight-plug end of Cable Assembly CD-1333 through the 2-in. hole in the base plate of the type B antenna mounting bracket (Fig. 4-20) and out the end of the 3-in. pipe; then connect the straight plug into the AN-188 antenna connector.

(7) Mount the AN-188 antenna on the type B mounting bracket (Fig. 4-57), and fasten it securely.

(8) Mount the assembled AN-188 antenna and type B mounting bracket to the antenna mast, as shown in Figure 4-56. Four 3/8-16 x 1-1/2 in. hex-head bolts, four 3/8-in. lockwashers, and four 3/8-16 hex nuts are supplied for this purpose.

(9) Run the two cable assemblies that are connected to the AN-188 and AT-197/GR antennas down the antenna mast and over to the 3-in. entrance conduit (weatherhead), as shown in Figure 4-56. With the strap kit (Table 4-33), strap the cables to the antenna mast and pipe railing.

(10) Feed the cable assemblies through the 3-in. entrance conduit (weatherhead) that leads to the overhead in the equipment room.

NOTE

The conduit to use is shown in Figure 4-56. In the equipment room, it is necessary to fish the cable ends through the cable-entrance port in the 6-in. pipe column that supports the control-tower roof.

(11) Run the antenna cable ends into the 6-in. x 4-in. opening in the top of the overhead cable duct in the equipment room to the vertical raceway, through the floor cable trench to racks No. 4 and No. 5.

(12) and (13) (Deleted)

NOTE

In steps "n" and "o" below, make certain that the color-coded conductor of each cable pair is connected to the odd-numbered terminals and the uncoded conductor to the even-numbered terminals. Arrange all cable runs neatly inside the racks and along the floors of the cable trenches.

n. Study Table 4-34 and Figures 4-13, 4-16, 4-49, and 4-58. Then connect audio wiring between rack No. 2 and rack No. 1 as follows:

(1) Run cable pair No. 1 (Table 4-34) from the inside of rack No. 2 down into the floor trench and over to the inside of rack No. 1. This pair is a 2-conductor, No. 20 AWG, shielded-pair cable.

(2) Prepare the cable end in rack No. 1 by cutting back the outer braid (approximately 1-1/4 in.), removing the insulation from the two conductors (approximately 1/2-in. back from ends), and tinning the bare ends with solder.

(3) Connect the color-coded conductor to terminal No. 1 on terminal board E6104 and the uncoded conductor to terminal No. 2 on terminal board E6104 (Fig. 4-13).

(4) At rack No. 2 extend the 2-conductor cable up to terminal board E202 on MX-1125/G panel No. 1 (Fig. 4-16 and 4-49), and cut it off 2 in. above the terminal board.

(5) Prepare the cable end as in step "n(2)" above.

(6) Connect the color-coded conductor to terminal No. 1 on terminal board E202 (located on MX-1125/G panel No. 1) and the uncoded conductor to terminal No. 6 on terminal board E202.

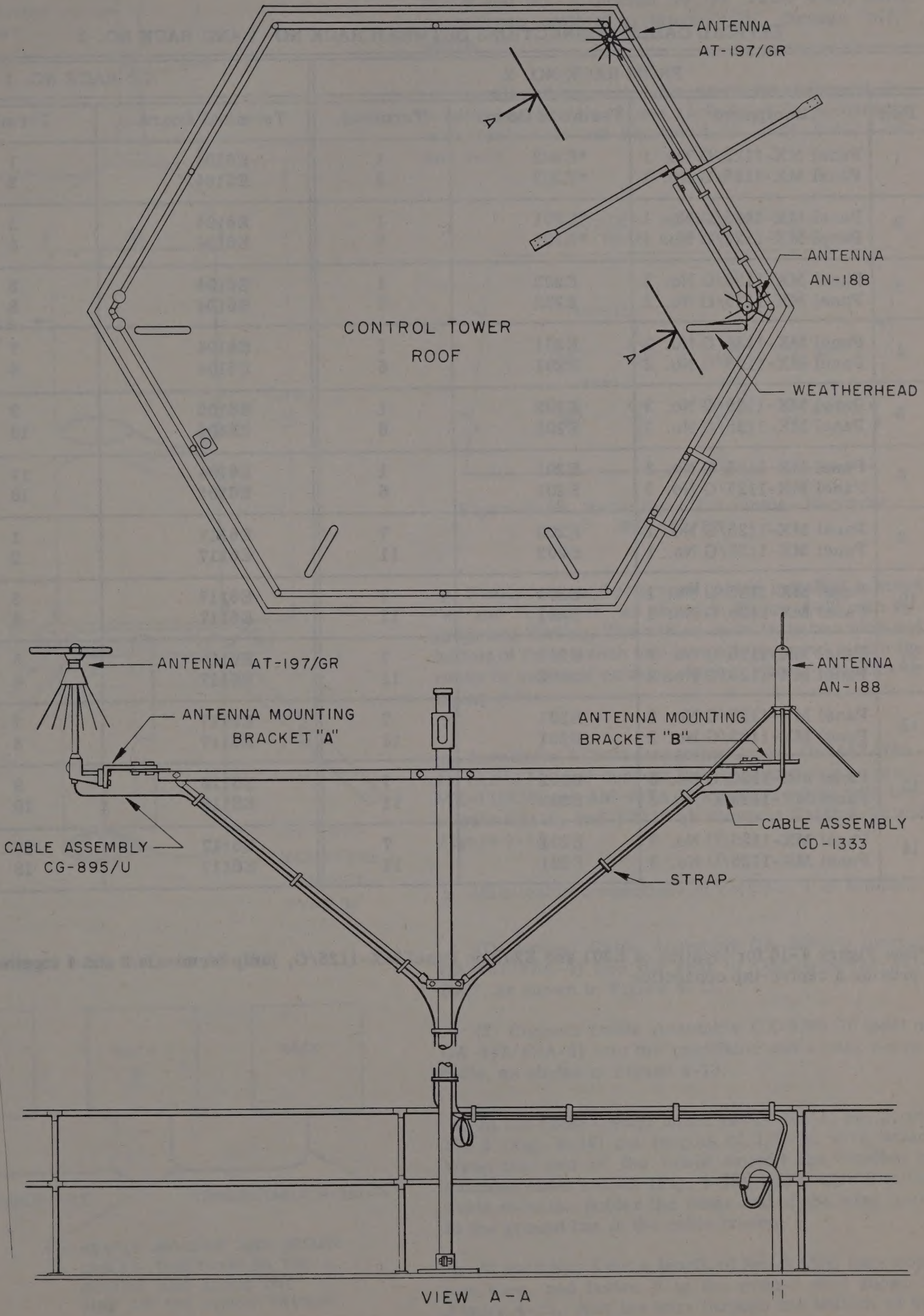

ANTENNA AT-197/GR
A
ANTENNA AN-188
CONTROL TOWER ROOF
A
WEATHERHEAD
ANTENNA AT-197/GR
ANTENNA MOUNTING BRACKET "A"
CABLE ASSEMBLY CG-895/U
ANTENNA AN-188
ANTENNA MOUNTING BRACKET "B"
CABLE ASSEMBLY CD-1333
STRAP
VIEW A-A

Figure 4-56. Antenna Installation—Control-Tower Roof

TABLE 4-34

TYPICAL CABLE CONNECTIONS BETWEEN RACK NO. 1 AND RACK NO. 2

FROM RACK NO. 2				TO RACK NO. 1	
Pair	Equipment	Terminal Board	Terminal	Terminal Board	Terminal
1	Panel MX-1125/G No. 1	*E202	1	E6104	1
	Panel MX-1125/G No. 1	*E202	6	E6104	2
2	Panel MX-1125/G No. 1	*E201	1	E6104	3
	Panel MX-1125/G No. 1	*E201	6	E6104	4
3	Panel MX-1125/G No. 2	E202	1	E6104	5
	Panel MX-1125/G No. 2	E202	6	E6104	6
4	Panel MX-1125/G No. 2	E201	1	E6104	7
	Panel MX-1125/G No. 2	E201	6	E6104	8
5	Panel MX-1125/G No. 3	E202	1	E6105	9
	Panel MX-1125/G No. 3	E202	6	E6105	10
6	Panel MX-1125/G No. 3	E201	1	E6104	17
	Panel MX-1125/G No. 3	E201	6	E6105	18
9	Panel MX-1125/G No. 1	E202	7	E6117	1
	Panel MX-1125/G No. 1	E202	11	E6117	2
10	Panel MX-1125/G No. 1	E201	7	E6117	3
	Panel MX-1125/G No. 1	E201	11	E6117	4
11	Panel MX-1125/G No. 2	E202	7	E6117	5
	Panel MX-1125/G No. 2	E202	11	E6117	6
12	Panel MX-1125/G No. 2	E201	7	E6117	7
	Panel MX-1125/G No. 2	E201	11	E6117	8
13	Panel MX-1125/G No. 3	E202	7	E6118	9
	Panel MX-1125/G No. 3	E202	11	E6118	10
14	Panel MX-1125/G No. 3	E201	7	E6117	17
	Panel MX-1125/G No. 3	E201	11	E6117	18

*See Figure 4-16 for location of E201 and E202 on Panel MX-1125/G, jump terminals 3 and 4 together to provide a center-tap connection.

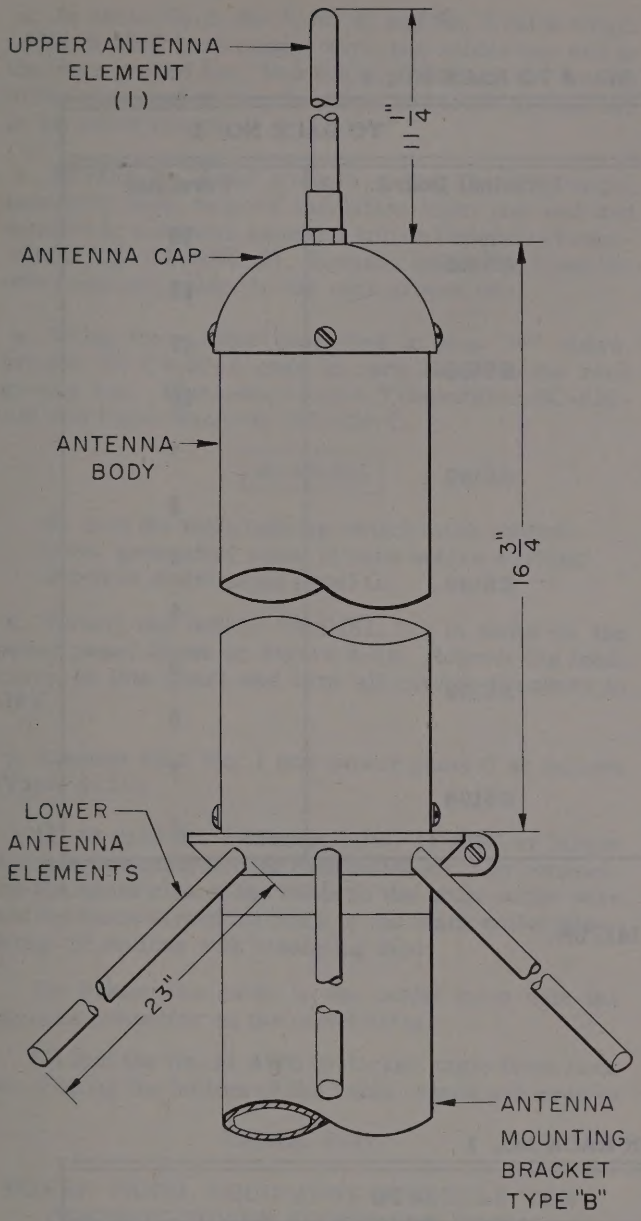

UPPER ANTENNA ELEMENT (1)
1 1/4"
ANTENNA CAP
ANTENNA BODY
16 3/4"
LOWER ANTENNA ELEMENTS
23"
ANTENNA MOUNTING BRACKET TYPE "B"

Figure 4-57. Antenna AN-188

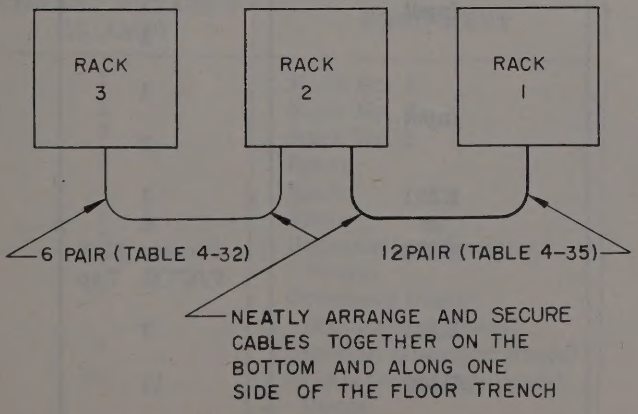

RACK 3
RACK 2
RACK 1
6 PAIR (TABLE 4-32)
12 PAIR (TABLE 4-35)
NEATLY ARRANGE AND SECURE CABLES TOGETHER ON THE BOTTOM AND ALONG ONE SIDE OF THE FLOOR TRENCH

Figure 4-58. Control-Tower Equipment Room—Audio Cabling Between Racks

(7) Install and connect cable pairs No. 2 through No. 6 and No. 9 through No. 14 (Table 4-34) using procedures outlined in steps "n(1)" through "n(6)" above.

o. Install and connect cable pairs No. 1 through No. 6 between rack No. 2 and rack No. 3 in accordance with Table 4-35 and Figures 4-13, 4-16, 4-49, 4-58, and 4-59.

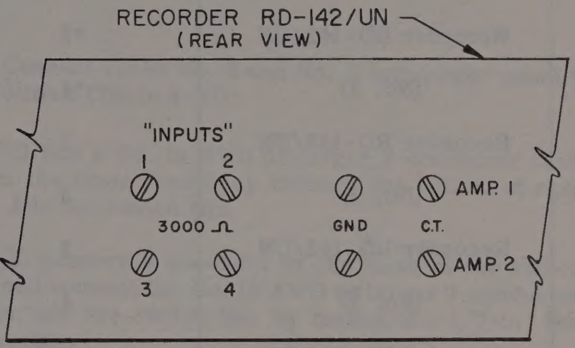

RECORDER RD-142/UN (REAR VIEW)
"INPUTS"
1
2
3000 ⎍
3
4
GND
AMP. 1
C.T.
AMP. 2

Figure 4-59. Audio Input Terminals—Recorder RD-142/UN

p. Neatly form and secure all cables installed in steps "n" and "o" above, as shown in Figure 4-58 with appropriate binding. The cables must lie on one side and bottom of floor trench and be neatly secured inside the racks by means of existing clamps, rings, wraplock or lacing twine.

q. In rack No. 1 (Interconnecting Group, OA-447/FSA-4) install and connect the loudspeaker panel, MX-1125/G and AM-447A/G input and output with terminals E6110, and E6118 as shown in Table 4-36 and Figure 4-13.

r. Make cable connections in rack No. 1 as follows:

(1) Connect Cable Assembly CX-2264/U (part of OA-447/FSA-4) into the rear of Oscillator OA-37/-FRT, as shown in Figure 4-13.

(2) Connect Cable Assembly CX-2263/U (part of OA-447/FSA-4) into the oscillator and a rack receptacle, as shown in Figure 4-13.

s. At the cable trench under racks No. 1, No. 2, and No. 3 (Fig. 4-49) cut lengths of 1/2-in. wire braid. Wrap one end of the braid around the bundles of shielded audio cables (Fig. 4-58), and solder it to the cable shields. Solder the other end of the wire braid to the ground bus in the cable trench.

t. At rack No. 1 cut a length of No. 6 AWG bare copper wire, and fasten it to the ground stud shown in Figure 4-13. Run the wire through the bottom of the rack, and solder it to the ground bus in the cable trench.

TABLE 4-35

CABLE CONNECTIONS FROM RACK NO. 3 TO RACK NO. 1

FROM RACK NO. 3			TO RACK NO. 1	
Pair	Equipment	Terminal	Terminal Board	Terminal
1	Recorder RD-142/UN (No. 1)	*1 *2	E6105	15 16
2	Recorder RD-142/UN (No. 1)	*3 *4	E6105	17 18
3	Recorder RD-142/UN (No. 2)	1 2	E6106	1 2
4	Recorder RD-142/UN (No. 2)	3 4	E6106	3 4
5	Recorder RD-142/UN (No. 3)	1 2	E6106	5 6
6	Recorder RD-142/UN (No. 3)	3 4	E6106	7 8

*See Figure 4-49 for terminal designations on recorder RD-142/UN.

TABLE 4-36

INTERNAL CONNECTIONS FOR RACK NO. 1

- FROM -			- TO -		
Pair	Terminal Board	Terminal	Equipment	Terminal Board	Terminal
1	E6110	13 14	Left Speaker	Input	1 2
2	E6110	15 16	Right Speaker	Input	1 2
3	E6105	11 12	Panel MX-1125/G (Same side as AM-447 Inst.)	E201 or E202	1 6 Jumper S&K F/CTR. Tap
4	E6118	11 12	Panel MX-1125/G (Same side as AM-447 Inst.)	E201 or E202	7 11

u. At racks No. 2, No. 3, No. 4, and No. 5 cut a length of No. 6 AWG bare copper wire, and solder one end to the rack ground bus. Run the wire through the bottom of the rack, and solder the other end to the ground bus in the cable trench.

v. At rack No. 4 cut a length of No. 12 AWG, white, insulated wire, remove insulation from one end and connect to a chassis mounting bolt on Receiver-Transmitter RT-178/ARC-27. Remove insulation from the other end and solder to the rack ground bus.

w. Using the method described in step "v" above, ground the CS-80-A case in rack No. 5 to the rack ground bus. This case houses Transmitter BC-625-AM and Radio Receiver BC-624-C.

WARNING

Be sure the main lighting switch in the control-tower generating room is open before working at power distribution panel G.

x. Stencil the letters "PANEL G" in white on the power panel shown in Figure 4-48. Remove the front cover of this panel and turn all circuit breakers to OFF.

y. Connect rack No. 1 into power panel G as follows (Table 4-37):

(1) At rack No. 1 connect a No. 14 AWG or larger 2-conductor cable into the rack outlet strip by connecting the white wire of the cable to the white outlet wire and the black wire of the cable to the black outlet wire. Wrap the splices with insulating tape.

(2) Fasten the cable to the outlet strip with the squeeze connector on the outlet strip.

(3) Run the No. 14 AWG or larger cable from rack No. 1 along the bottom of the cable trench and over to panel G. Then pass cable through a conduit from the floor trench to the inside of panel G.

(4) Connect the white wire of this cable to the neutral (ground bus) in panel G.

(5) Connect the black wire to the terminal on circuit breaker No. 1.

(6) Print "RACK NO. 1" on the door of panel G to identify circuit breaker No. 1.

TABLE 4-37

POWER PANEL EQUIPMENT SCHEDULE FOR CONTROL-TOWER EQUIPMENT ROOM

PANEL "G"	
CIRCUIT BREAKER (15-AMP)	EQUIPMENT
1	Rack No. 1
2	Rack No. 2
3	Rack No. 3
4	Spare
5	Spare
6	Spare
7	Receptacles (Junction Room)
8	Overhead Lights (Equipment Room)
9	Lighting (Junction Room)
10	Receptacles (Equipment Room)
11-16	Spares
17-18	Spares (208V)

z. Connect racks No. 2 and No. 3 into power panel G as follows (Table 4-37):

(1) Run a No. 14 AWG or larger 2-conductor cable from the floor trench up through the bottom of rack No. 2 to the switch box.

(2) Remove a knockout in the base of the switch box and connect the No. 14 AWG or larger 2-conductor cable into the switch box by means of a 1/2-in. box connector.

(3) Connect the white wire of the cable to the neutral terminal (the terminal that is connected to the white wire from the rack receptacles).

NOTE

If both legs of the switch are fused, connect a jumper of No. 12 AWG, white, insulated wire across the fuse holder that is connected to the white wires.

(4) Connect the black wire to the other switch terminals. Screw a 15-amp plug fuse into the fuse holder that is connected to the black wires.

(5) Run the No. 14 AWG or larger cable from rack No. 2 along the bottom of the cable trench and over to panel G. Then pass the cable through a conduit from the floor trench up to the inside of panel G.

(6) Connect the white wire of the cable to the neutral (ground bus) in panel G.

(7) Connect the black wire to the terminal on circuit breaker No. 2.

(8) Print "RACK NO. 2" on the door of panel G to identify circuit breaker No. 2.

(9) In a similar manner, connect rack No. 3 to circuit breaker No. 3 in power panel G.

aa. Bundle the power cables together neatly and secure in the cable trench.

ab. Replace front cover and door on panel G.

ac. At rack No. 2 connect the bare wires of a power cable assembly to the two No. 14 terminals (115V, 50/60 cps) on Mounting Panel MX-1125/G No. 1, and insert the plug on the other end of this cable assembly

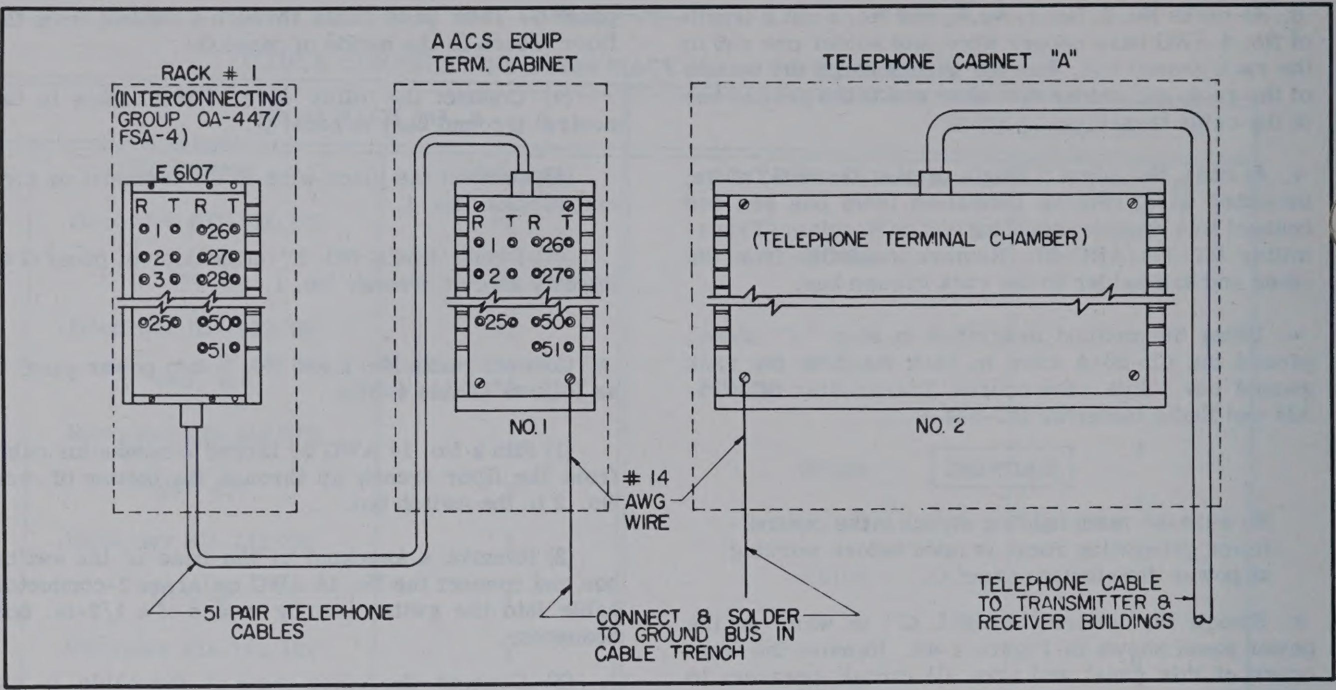

RACK # 1
(INTERCONNECTING GROUP OA-447/ FSA-4)
E 6107
R T R T
1 26
2 27
3 28
25 50
51
AACS EQUIP TERM. CABINET
R T R T
1 26
2 27
25 50
51
NO. 1
TELEPHONE CABINET "A"
(TELEPHONE TERMINAL CHAMBER)
NO. 2
# 14 AWG WIRE
51 PAIR TELEPHONE CABLES
CONNECT & SOLDER TO GROUND BUS IN CABLE TRENCH
TELEPHONE CABLE TO TRANSMITTER & RECEIVER BUILDINGS

Figure 4-60. Telephone Terminal Chambers—Control-Tower Equipment Room

into an a-c receptacle on the rack (Fig. 4-16 and 4-49). In like manner connect Mounting Panel MX-1125/G No. 2, No. 3, and No. 4 into a-c receptacles on the rack.

ad. With No. 12 AWG, white, insulated wire, ground and strap together telephone terminal chambers No. 1 and No. 2 in telephone cabinet A, as shown in Figures 4-48 and 4-60.

ae. Test telephone pairs No. 1 through No. 51 in the telephone cable that connects terminal chamber E6107 in rack No. 1 and the 51-pair terminal chamber No. 1 located in telephone cabinet A (Fig. 4-60). The terminals designated on terminal chamber E6107 for each pair should be connected to the corresponding terminals of terminal chamber No. 1 in cabinet A. For example, the left and right terminals of pair No. 1 on E6107 must be connected to the left and right terminals of pair No. 1 on terminal chamber No. 1 in cabinet A.

af. Label the jacks in rack No. 1 as shown in Figure 4-61.

ag. Fabricate power cables of No. 12 AWG or larger wire for standby equipment. (AN/ARC-27 or equal and RA-62 power supply for VHF equipment) pigtail and tag each line in the equipment room floor trench.

4-46. INSTALLATION IN AIR-TRAFFIC-CONTROL-TOWER CAB.

4-47. GENERAL. Proceed in accordance with the sequence indicated in Table 4-4. Carefully read all the instructions in a particular installation procedure before beginning that installation. Then make the installation by following the steps in the order given herein.

4-48. UNPACKING CAB EQUIPMENT. Use care to avoid damaging the equipment.

a. Move the equipment listed in Table 4-11 to the control-tower cab.

b. Unpack all components and check for shipping damage, loose connections, and mechanical misalignment, and remove all blocking.

c. Make necessary repairs or adjustments.

d. Report missing or damaged components to the local communications operating unit.

4-49. INSTALLATION OF EQUIPMENT AND WIRING. (Fig. 1-23, 4-13, 4-48, 4-51, 4-52, and 4-62 through 4-87.) Table 4-38 lists the material supplied for installation of the electronic equipment and wiring in the cab of the air traffic control tower.

4-50. To install the electronic equipment and wiring in the control-tower cab, follow steps "a" through "at" below. Control Tower Console CY-888/CRC, completely assembled and with front covers on, is shown in Figure 1-23. The five units of the console in their proper relative positions, but with the front covers removed to show the layout of equipment, appear in Figure 4-62.

a. Remove all steel covers from floor trenches in the control-tower cab and place them on the floor where they will not interfere with the installation.

b. To prepare Control-Monitor Group OA-115/CRC for installation, proceed as follows (Fig. 4-63):

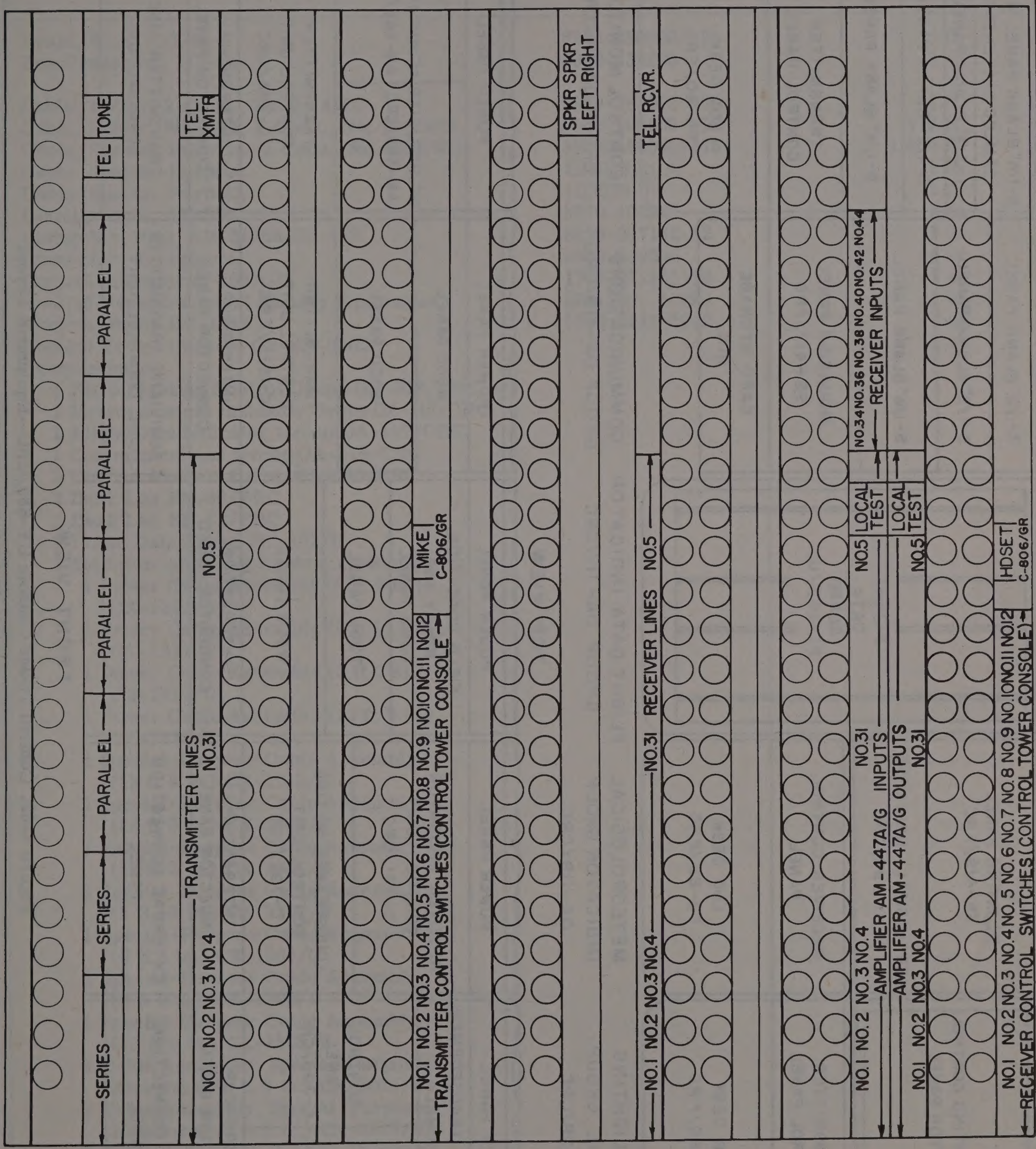

SERIES
SERIES
PARALLEL
PARALLEL
PARALLEL
PARALLEL
PARALLEL
TEL
TONE
NO.1 NO.2 NO.3 NO.4
TRANSMITTER LINES
NO.31
NO.5
TEL. XMTR
NO.1 NO.2 NO.3 NO.4 NO.5 NO.6 NO.7 NO.8 NO.9 NO.10 NO.11 NO.12
TRANSMITTER CONTROL SWITCHES (CONTROL TOWER CONSOLE)
MIKE C-806/GR
SPKR LEFT
SPKR RIGHT
NO.1 NO.2 NO.3 NO.4
RECEIVER LINES
NO.31
NO.5
TEL. RCVR.
NO.1 NO.2 NO.3 NO.4
AMPLIFIER AM-447A/G INPUTS
NO.31
NO.5
LOCAL TEST
NO.34 NO.36 NO.38 NO.40 NO.42 NO.44
RECEIVER INPUTS
NO.1 NO.2 NO.3 NO.4
AMPLIFIER AM-447A/G OUTPUTS
NO.31
NO.5
LOCAL TEST
NO.1 NO.2 NO.3 NO.4 NO.5 NO.6 NO.7 NO.8 NO.9 NO.10 NO.11 NO.12
RECEIVER CONTROL SWITCHES (CONTROL TOWER CONSOLE)
HDSET C-806/GR

Figure 4-61. Rack No. 1—Identification of Jacks

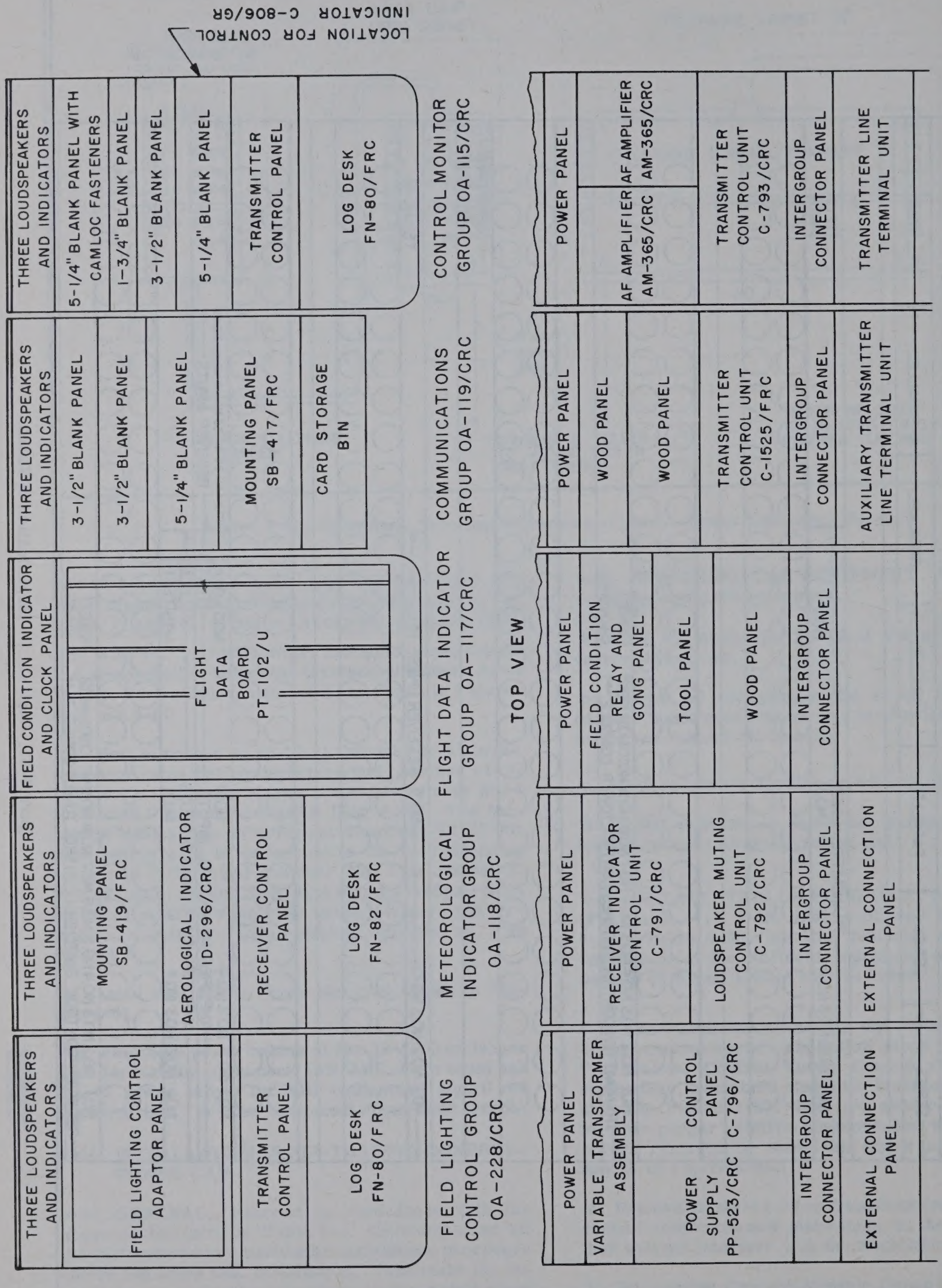

LOCATION FOR CONTROL INDICATOR C-806/GR
THREE LOUDSPEAKERS AND INDICATORS
FIELD LIGHTING CONTROL ADAPTOR PANEL
TRANSMITTER CONTROL PANEL
LOG DESK FN-80/FRC
FIELD LIGHTING CONTROL GROUP OA-228/CRC
THREE LOUDSPEAKERS AND INDICATORS
MOUNTING PANEL SB-419/FRC
AEROLOGICAL INDICATOR ID-296/CRC
RECEIVER CONTROL PANEL
LOG DESK FN-82/FRC
METEOROLOGICAL INDICATOR GROUP OA-118/CRC
FIELD CONDITION INDICATOR AND CLOCK PANEL
FLIGHT DATA BOARD PT-102/U
FLIGHT DATA INDICATOR GROUP OA-117/CRC
THREE LOUDSPEAKERS AND INDICATORS
3-1/2" BLANK PANEL
3-1/2" BLANK PANEL
5-1/4" BLANK PANEL
MOUNTING PANEL SB-417/FRC
CARD STORAGE BIN
COMMUNICATIONS GROUP OA-119/CRC
THREE LOUDSPEAKERS AND INDICATORS
5-1/4" BLANK PANEL WITH CAMLOC FASTENERS
1-3/4" BLANK PANEL
3-1/2" BLANK PANEL
5-1/4" BLANK PANEL
TRANSMITTER CONTROL PANEL
LOG DESK FN-80/FRC
CONTROL MONITOR GROUP OA-115/CRC
TOP VIEW
POWER PANEL
VARIABLE TRANSFORMER ASSEMBLY
POWER SUPPLY PP-523/CRC
CONTROL PANEL C-796/CRC
INTERGROUP CONNECTOR PANEL
EXTERNAL CONNECTION PANEL
POWER PANEL
RECEIVER INDICATOR CONTROL UNIT C-791/CRC
LOUDSPEAKER MUTING CONTROL UNIT C-792/CRC
INTERGROUP CONNECTOR PANEL
EXTERNAL CONNECTION PANEL
POWER PANEL
FIELD CONDITION RELAY AND GONG PANEL
TOOL PANEL
WOOD PANEL
INTERGROUP CONNECTOR PANEL
POWER PANEL
WOOD PANEL
WOOD PANEL
TRANSMITTER CONTROL UNIT C-1525/FRC
INTERGROUP CONNECTOR PANEL
AUXILIARY TRANSMITTER LINE TERMINAL UNIT
POWER PANEL
AF AMPLIFIER AM-365/CRC
AF AMPLIFIER AM-365/CRC
TRANSMITTER CONTROL UNIT C-793/CRC
INTERGROUP CONNECTOR PANEL
TRANSMITTER LINE TERMINAL UNIT
FRONT VIEW

Figure 4-62. Control Tower Console CY-888/CRC—Equipment Layout

TABLE 4-38

TYPICAL BOM FOR INSTALLATION AND WIRING OF ELECTRONIC EQUIPMENT IN CONTROL-TOWER CAB

Description	Stock No.	Quantity per Installation
Braid, Wire, 1/2-in.	8860-050000-825	15 ft
Box Connector, 1/2-in.	8860-038200	5 ea
Cable, Power, 2-Cond., No. 14 AWG	8860-261000-475	15 ft
Cable, Power, WC-643, 2-Cond., No. 10 AWG	8860-196000-355	170 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	1,600 ft
Cable, Special-Purpose	1B3016-10.2	75 ft
Cable, Special-Purpose	1B3020-15	75 ft
Clamp, Cable, AN-3057-12	8850-100925	2 ea
Connector, Plug, AN-3106A-22-14S	8850-367162-52	1 ea
Connector, Receptacle	8850-530300	4 ea
Control Indicator C-806/GR	1700-211945116	1 ea
Control Panel for Local Standby Equipment	(See par. 3-59.)	1 ea
Control, Radio BC-1314	1700-211781620	1 ea
Control Tower Console CY-888/CRC, consisting of:		1 ea
1 Field Lighting Control Group OA-228/CRC		
1 Meteorological Indicator Group OA-118/CRC		
1 Flight Data Indicator Group OA-117/CRC		
1 Communications Group OA-119/CRC		
1 Control Monitor Group OA-115/CRC		
2 Desk Log FN-80/FRC		
1 Desk Log FN-82/FRC		
1 Flight Data Board PT-102/U		
1 Set Interconnecting Cables, consisting of:		
1 Power Cable Assembly (6 ft 5 in.) CX-1311/U		
1 Power Cable Assembly (8 ft 11 in.) CX-1311/U		
1 Power Cable Assembly (9 ft 5 in.) CX-1311/U		
1 Power Cable Assembly (13 ft 9 in.) CX-1311/U		
1 Special-Purpose Cable Assembly (12 ft 3 in.) CX-1310/U		
1 Special-Purpose Cable Assembly (12 ft 0 in.) CX-1309/U		
1 Special-Purpose Cable Assembly (12 ft 5 in.) CX-1308/U		
1 Special-Purpose Cable Assembly (5 ft 10 in.) CX-1307/U		
1 Special-Purpose Cable Assembly (6 ft 1 in.) CX-1306/U		
1 Special-Purpose Cable Assembly (9 ft 0 in.) CX-1305/U		
1 Special-Purpose Cable Assembly (10 ft 6 in.) CX-1303/U		
1 Cable Assembly, Special-Purpose, Electrical (6 ft 0 in.) CX-3077/U		
1 Cable Assembly, Special-Purpose, Electrical (6 ft 6 in.) CX-3077/U		
1 Cable Assembly, Special-Purpose, Electrical (6 ft 0 in.) CX-3078/U		
1 Cable Assembly, Special-Purpose, Electrical (4 ft 6 in.) CX-3078/U		
1 Cable Assembly, Special-Purpose, Electrical (7 ft 6 in.) CX-3114/FRC-19B		

TABLE 4-38—Continued

Description	Stock No.	Quantity per Installation
Cord, Headset, CD-307	1790-321018000	1 ea
Cord CD-307A	(See note on Table 4-33.)	1 ea
Cover, Outlet Box, 4-in.	8800-285300	2 ea
Emergency Air Traffic Control Lamp Power Transfer Unit	(See par. 3-58.)	1 ea
Headset HS-33	1790-207600000	1 ea
Headset HS-33A	(See note on Table 4-33.)	1 ea
Junction Box, 4-in. x 4-in., Square	8800-438260	2 ea
Kollsman Altimeter MS24134-( )	1600-NSL4296	1 ea
Microphone T-17	(See note on Table 4-33.)	1 ea
Nut, Machine, Brass, No. 8-32	6700-352750	6 ea
Plug, Telephone, Type PJ-055-B	2Z228A-55B	2 ea
Plug PL-169	8850-660150	2 ea
Radio Set Control C-628/ARC-27	(See note on Table 4-33.)	1 ea
Receptacle AN-3101A-22-14P	8850-368490-52	1 ea
Screw, Machine, Brass, No. 8-32, 3/4-in.	6700-725075-418	6 ea
Supplementary Cabinet	(See par. 3-60.)	2 ea
Tape, Scotch, No. 0	8800-873600-0	1 roll
Tape, Scotch, No. 1	8800-873600-1	1 roll
Tape, Scotch, No. 2	8800-873600-2	1 roll
Tape, Scotch, No. 3	8800-873600-3	1 roll
Tape, Scotch, No. 4	8800-873600-4	1 roll
Tape, Scotch, No. 5	8800-873600-5	1 roll
Tape, Scotch, No. 6	8800-873600-6	1 roll
Tape, Scotch, No. 7	8800-873600-7	1 roll
Tape, Scotch, No. 8	8800-873600-8	1 roll
Tape, Scotch, No. 9	8800-873600-9	1 roll
Wire, Copper, No. 6 AWG S.D.	1A806.9	10 ft
Wire, Electrical, No. 12 AWG, Insulated, White	1B119	25 ft
Wire, Electrical, No. 18 AWG, Insulated, Red	1B1318.2	25 ft

(1) Remove the front cover plate.

(2) Pull out each AF Amplifier AM-365/CRC far enough to disconnect the two cables on the rear apron of each chassis.

(3) Remove each amplifier from the cabinet. Store in a safe place until ready to be reinstalled.

(4) Pull out Transmitter Control Unit C-793/CRC far enough to disconnect the seven cables on the rear chassis apron.

(5) Remove transmitter control unit from the console. Store with remaining equipment.

(6) Remove the four screws that hold the transmitter line terminal unit in place.

(7) Slide the transmitter line terminal unit forward.

(8) Remove the four screws holding the intergroup connector panel in place.

(9) Remove the four bolts holding the cabinet to the base plate, and remove the base plate with skid attached.

(10) Remove the four bolts attaching the skid to the base plate.

(11) Cut a 2-in. x 5-in. hole in the base plate, as shown in Figure 4-64.

c. To prepare Communications Group OA-119/CRC for installation, proceed as follows (Fig. 4-65):

(1) Remove the front cover plate. Remove packing material and hardware.

(2) Slide Transmitter Control Unit C-1525/FRC

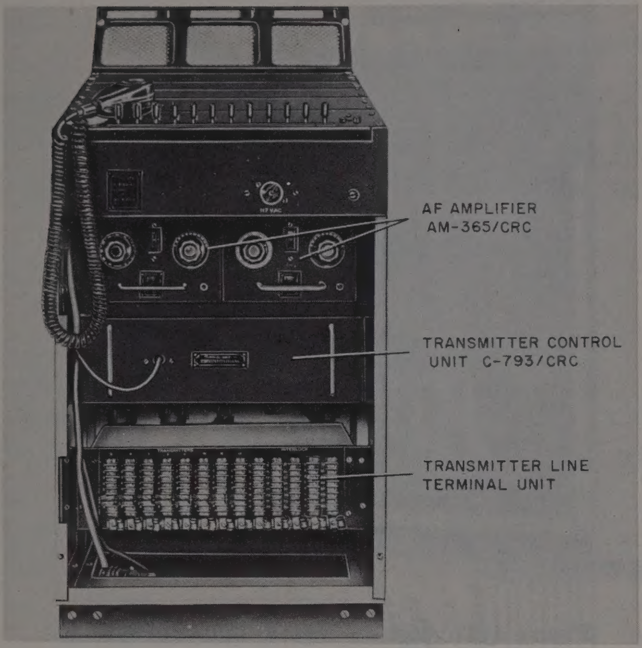

AF AMPLIFIER AM-365/CRC
TRANSMITTER CONTROL UNIT C-793/CRC
TRANSMITTER LINE TERMINAL UNIT

Figure 4-63. Control-Monitor Group OA-115/CRC (Front Cover Removed)

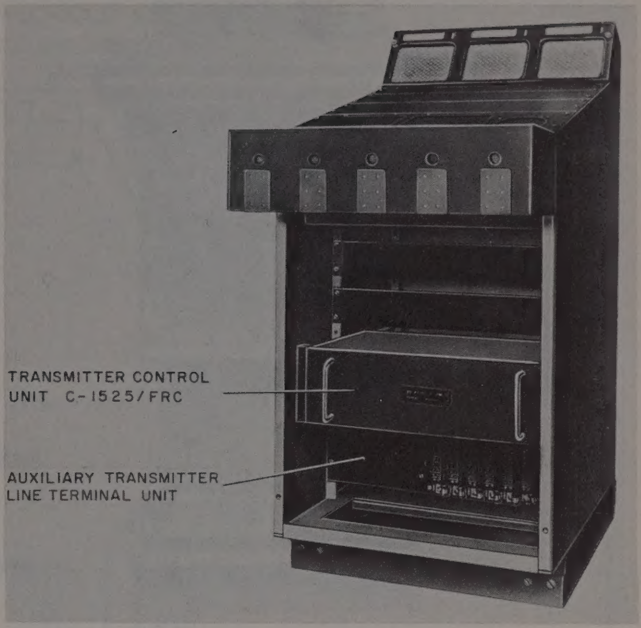

TRANSMITTER CONTROL UNIT C-1525/FRC
AUXILIARY TRANSMITTER LINE TERMINAL UNIT

Figure 4-65. Communications Group OA-119/CRC (Front Cover Removed)

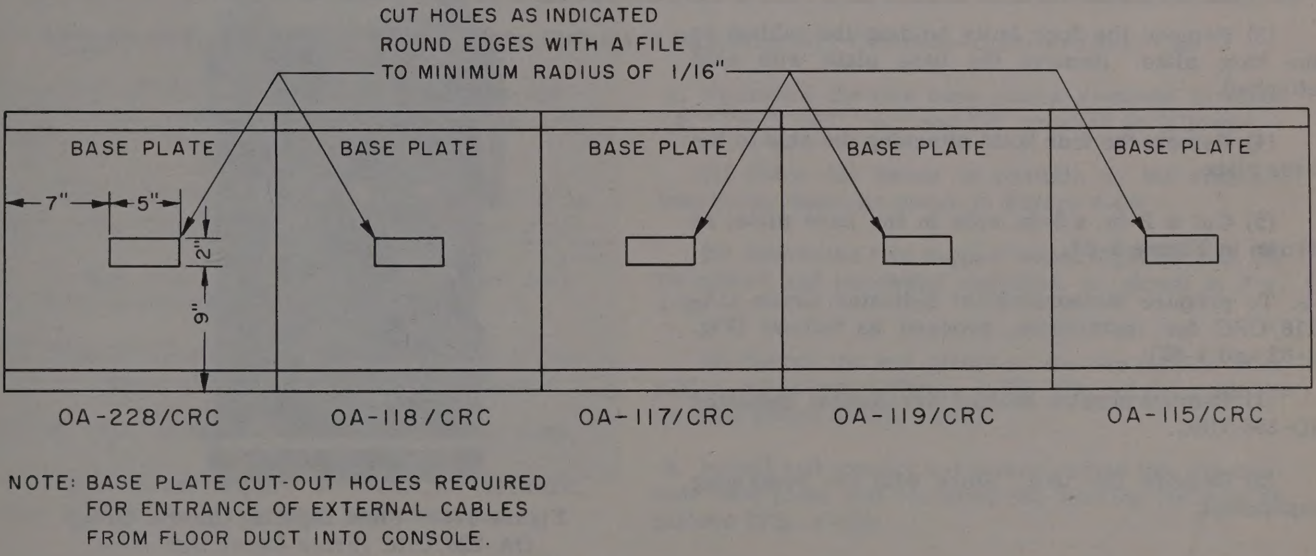

CUT HOLES AS INDICATED
ROUND EDGES WITH A FILE
TO MINIMUM RADIUS OF 1/16"
BASE PLATE
BASE PLATE
BASE PLATE
BASE PLATE
BASE PLATE
7"
5"
2"
9"
OA-228/CRC
OA-118/CRC
OA-117/CRC
OA-119/CRC
OA-115/CRC
NOTE: BASE PLATE CUT-OUT HOLES REQUIRED
FOR ENTRANCE OF EXTERNAL CABLES
FROM FLOOR DUCT INTO CONSOLE.

Figure 4-64. Console Base Plate—Cutout Details

forward. Remove the cable connected to the rear of the unit.

(3) Remove the unit. Store with remaining equipment.

(4) Remove the four screws holding the auxiliary transmitter line terminal unit to cabinet. Remove the unit and store with remaining equipment.

(5) Remove the four screws holding the intergroup connector panel in place.

(6) Remove the four bolts holding the cabinet to the base plate. Remove the base plate with skid attached.

(7) Remove the four bolts attaching the skid to the base plate.

(8) Cut a 2-in. x 5-in. hole in the base plate, as shown in Figure 4-64.

d. To prepare Flight Data Indicator Group OA-117/-CRC for installation, proceed as follows (Fig. 4-66):

(1) Remove the front cover plate.

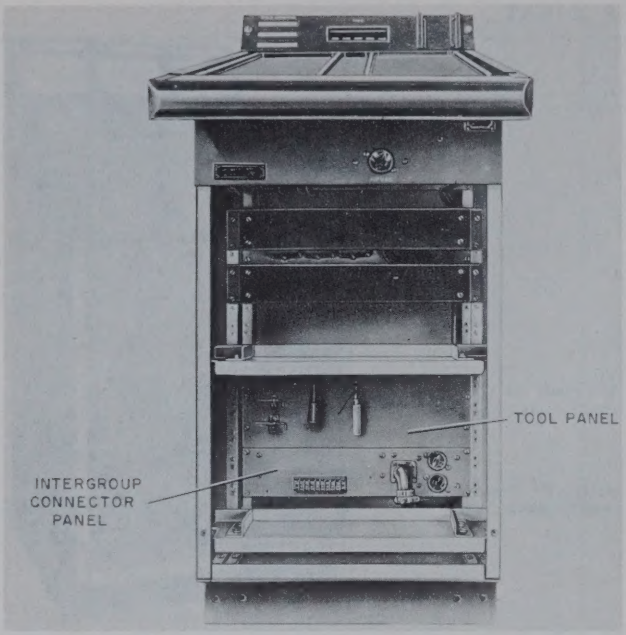

TOOL PANEL
INTERGROUP CONNECTOR PANEL

Figure 4-66. Flight Data Indicator Group OA-117/CRC (Front Cover Removed)

(2) Remove the four screws holding the intergroup connector panel in place.

(3) Remove the four bolts holding the cabinet to the base plate. Remove the base plate with skid attached.

(4) Remove the four bolts attaching the skid to the base plate.

(5) Cut a 2-in. x 5-in. hole in the base plate, as shown in Figure 4-64.

e. To prepare Meteorological Indicator Group OA-118/CRC for installation, proceed as follows (Fig. 4-62 and 4-67):

(1) Remove screws holding Aerological Indicator ID-296/CRC.

(2) Remove the unit. Store with the remaining equipment.

(3) Remove the front cover plate. Remove the packing material and hardware.

(4) Slide Control Unit C-792/CRC forward. Disconnect the five cables connected to the rear of the unit.

(5) Remove the unit. Store with remaining equipment.

(6) Slide Indicator Control Unit C-791/CRC forward. Disconnect the two cables on the rear chassis apron.

(7) Remove the unit. Store with the remaining equipment.

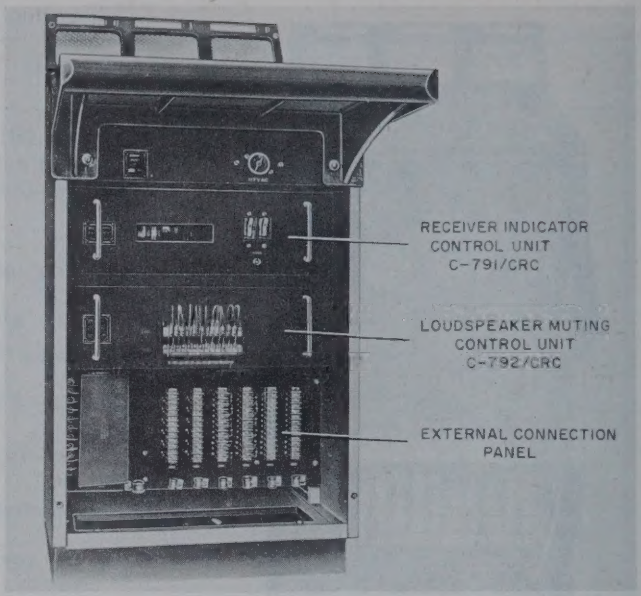

RECEIVER INDICATOR CONTROL UNIT C-791/CRC
LOUDSPEAKER MUTING CONTROL UNIT C-792/CRC
EXTERNAL CONNECTION PANEL

Figure 4-67. Meteorological Indicator Group OA-118/CRC (Front Cover Removed)

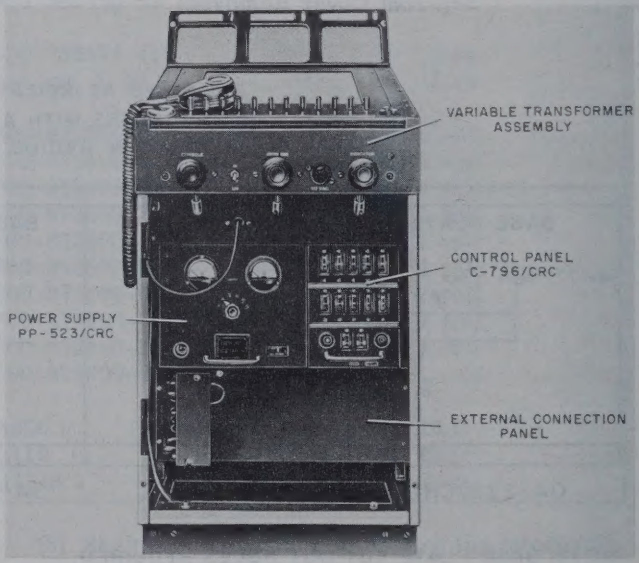

VARIABLE TRANSFORMER ASSEMBLY
CONTROL PANEL C-796/CRC
POWER SUPPLY PP-523/CRC
EXTERNAL CONNECTION PANEL

Figure 4-68. Field Lighting Control Group OA-228/CRC (Front Cover Removed)

(8) Remove the four screws holding the external connection panel in place.

(9) Remove the four screws holding the intergroup connector panel in place.

(10) Remove the four bolts holding the cabinet to the base plate. Remove the base plate with skid attached.

(11) Remove the four bolts attaching the skid to the base plate.

(12) Cut a 2-in. x 5-in. hole in the base plate, as shown in Figure 4-64.

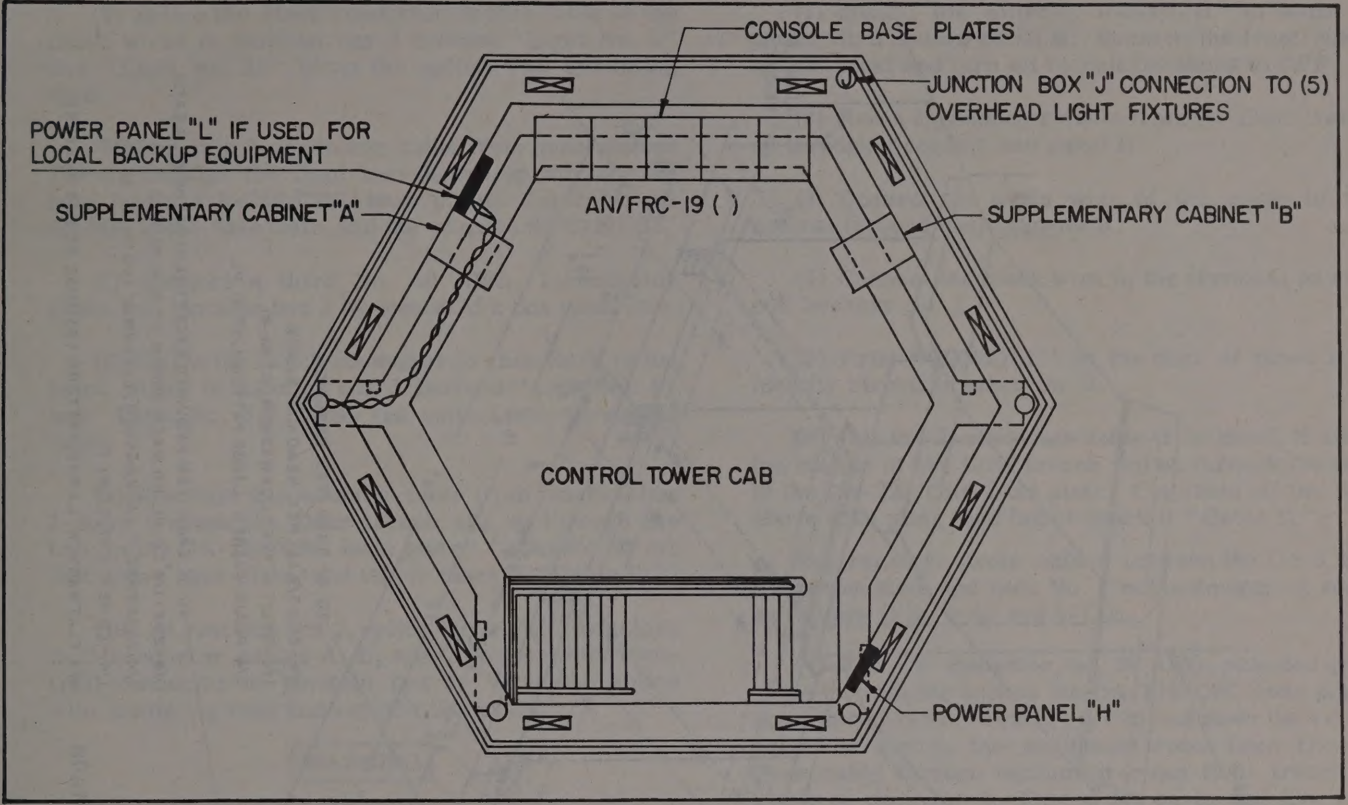

CONSOLE BASE PLATES
JUNCTION BOX "J" CONNECTION TO (5) OVERHEAD LIGHT FIXTURES
POWER PANEL "L" IF USED FOR LOCAL BACKUP EQUIPMENT
SUPPLEMENTARY CABINET "A"
AN/FRC-19 ( )
SUPPLEMENTARY CABINET "B"
CONTROL TOWER CAB
POWER PANEL "H"

Figure 4-69. Locations of Console Base Plates and Supplementary Cabinets—Control-Tower Cab

f. To prepare Field Lighting Control Group OA-228/-CRC for installation, proceed as follows (Fig. 4-62 and 4-68):

(1) Remove the eight screws holding the field lighting control adaptor panel in place. Remove panel.

(2) Remove front cover plate. Remove all packing material and hardware.

(3) Slide Control Panel C-796/CRC forward. Disconnect the three cables on the rear chassis apron.

(4) Remove the unit. Store with remaining units.

(5) Slide Power Supply PP-523/CRC forward. Disconnect the cable on the rear chassis apron.

(6) Remove the unit. Store with remaining units.

(7) Remove the four screws holding the external connection panel in place.

(8) Remove the four screws holding the intergroup connector panel in place.

(9) Remove the four bolts holding the cabinet to the base plate. Remove the base plate with skid attached.

(10) Remove the four bolts attaching the skid to the base plate.

(11) Cut a 2-in. x 5-in. hole in the base plate, as shown in Figure 4-64.

g. To install the five base plates removed in steps "b," "c," "d," "e," and "f" proceed as follows:

(1) Place the bases in position on the control-tower-cab floor, as shown in Figure 4-69.

(2) Fasten the five support bases together with the tie-plates and hardware supplied, as shown in Fig. 4-70.

(3) Install the end plates on the two outside base plates, as shown in Figure 4-70. (Do not set cabinets on base plates at this time.)

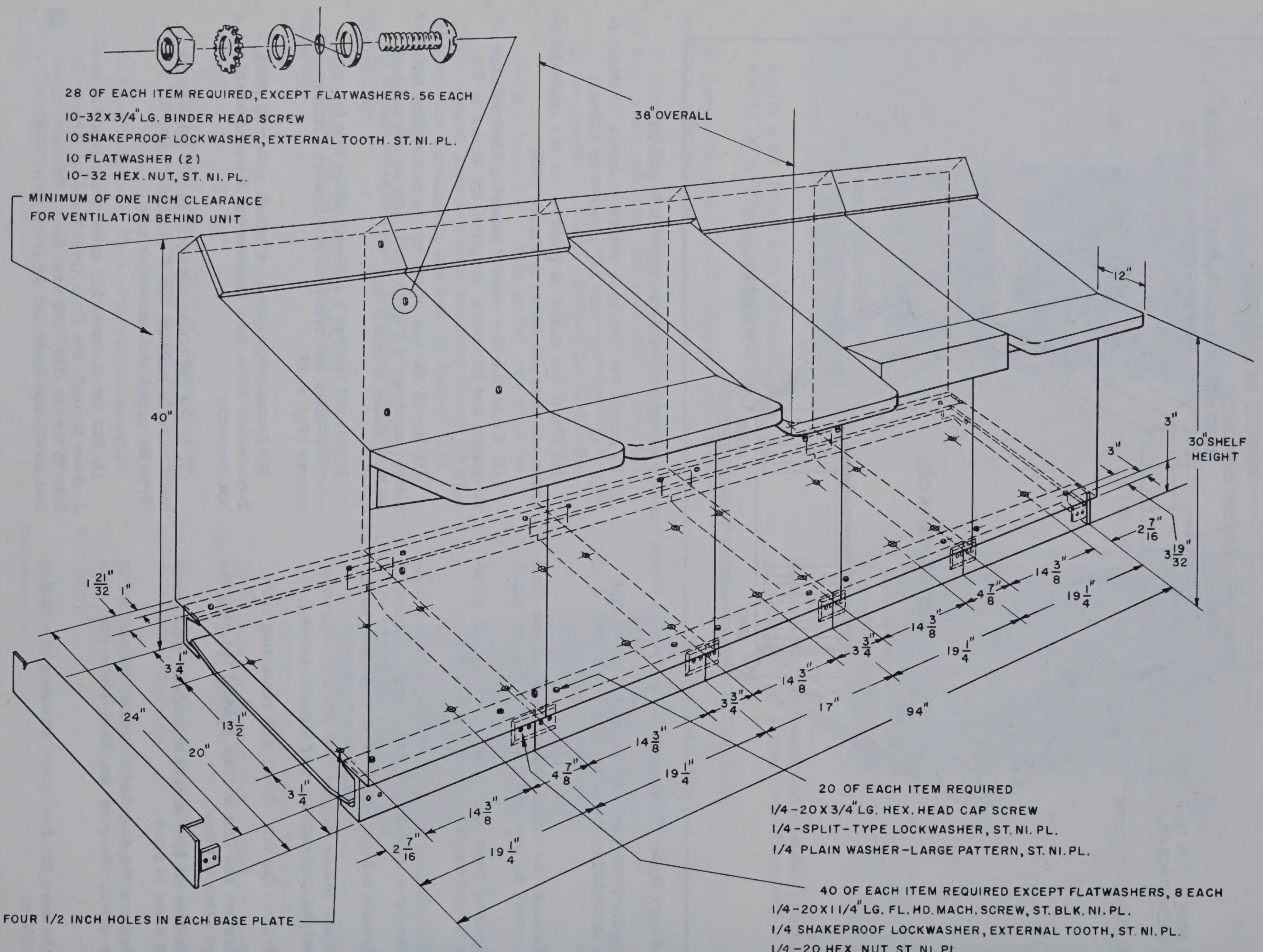
h. Install and connect a-c power cables into the console base plate and overhead cab-lighting fixtures as follows (Fig. 4-69):

(1) Remove box cover. Connect a No. 10 AWG, 2-conductor cable into junction box J by means of a box connector.

(2) Splice the black conductor in this cable to the black wire in junction box J marked "Light No. 3." Wrap the splice with insulating tape.

(3) Run the 2-conductor cable from junction box J, down through the floor trench and up through the hole in the OA-228/CRC base plate. Cut cable off six feet above base plate and tag or mark it "Cable A."

(4) Connect a second No. 10 AWG, 2-conductor cable into junction box J by means of a box connector.



28 OF EACH ITEM REQUIRED, EXCEPT FLATWASHERS. 56 EACH
10-32 X 3/4" LG. BINDER HEAD SCREW
10 SHAKEPROOF LOCKWASHER, EXTERNAL TOOTH. ST. NI. PL.
10 FLATWASHER (2)
10-32 HEX. NUT, ST. NI. PL.

MINIMUM OF ONE INCH CLEARANCE FOR VENTILATION BEHIND UNIT

20 OF EACH ITEM REQUIRED
1/4-20 X 3/4" LG. HEX. HEAD CAP SCREW
1/4-SPLIT-TYPE LOCKWASHER, ST. NI. PL.
1/4 PLAIN WASHER-LARGE PATTERN, ST. NI. PL.

40 OF EACH ITEM REQUIRED EXCEPT FLATWASHERS, 8 EACH
1/4-20 X 1 1/4" LG. FL. HD. MACH. SCREW, ST. BLK. NI. PL.
1/4 SHAKEPROOF LOCKWASHER, EXTERNAL TOOTH, ST. NI. PL.
1/4-20 HEX. NUT, ST. NI. PL.
1/4 FLATWASHER, LARGE PATTERN (8) (USE AT END PLATES)

FOUR 1/2 INCH HOLES IN EACH BASE PLATE

38" OVERALL
12"
30" SHELF HEIGHT
3"
3"
3 19/32
2 7/16"
40"
1 21/32"
1"
3 1/4"
24"
13 1/2"
20"
3 1/4"
2 7/16"
19 1/4"
14 3/8"
4 7/8"
19 1/4"
14 3/8"
3 3/4"
17"
14 3/8"
3 3/4"
19 1/4"
14 3/8"
4 7/8"
19 1/4"
14 3/8"
94"

Figure 4-70. Control Tower Console CY-888/CRC—Assembly Details

(5) Splice the black conductor in this cable to the black wires in junction box J marked "Light No. 1" and "Light No. 2." Wrap the splice with insulating tape.

(6) Run this 2-conductor cable from junction box J down through the floor trench and up through the hole in the OA-228/CRC base plate. Cut cable off six feet above base plate, and tag or mark it "Cable B."

(7) Connect a third No. 10 AWG, 2-conductor cable into junction box J by means of a box connector.

(8) Splice the black conductor in this cable to the black wires in junction box J marked "Light No. 4" and "Light No. 5." Wrap the splice with insulating tape.

(9) Run this 2-conductor cable from junction box J down through the floor trench and up through the hole in the OA-228/CRC base plate. Cut cable off six feet above base plate, and tag or mark it "Cable C."

(10) At junction box J, splice the white conductors in 2-conductor cables A, B, and C to the white (neutral) conductor in junction box J. Wrap the splice with insulating tape and replace box cover.

WARNING

Be sure that the main lighting switch located in the control-tower generating room is open before working at power distribution panel H.

i. Connect the console power-supply cable between the console base plate and power panel H as follows (Fig. 4-69):

(1) Stencil the letters "PANEL H" in white on power distribution panel H. Remove the front cover of this panel and turn all circuit breakers to OFF.

(2) Run a 2-conductor cable from the floor trench up through a conduit into panel H.

(3) Connect the white wire of the cable to the neutral (ground bus) in panel H.

(4) Connect the black wire to the terminal on circuit breaker No. 2.

(5) Print "CONSOLE" on the door of panel H to identify circuit breaker No. 2.

(6) Run the 2-conductor cable from panel H along the bottom of the floor trench and up through the hole in the OA-228/CRC base plate. Cut cable off two feet above base plate, and tag or mark it "Cable D."

j. Run receiver audio cables between the OA-118/-CRC base plate and rack No. 1 in the equipment room as follows (Fig. 4-48 and 4-71):

(1) Run a 2-conductor, No. 20 AWG, shielded-pair cable through the hole in the OA-118/CRC base plate, down into the floor trench, over to and down the vertical riser duct to the equipment-room floor trench. Pass cable through equipment-room floor trench up inside of rack No. 1. Extend the cable end five feet up into rack No. 1.

(2) Extend the other end of this cable three feet up from the OA-118/CRC base-plate hole and cut off.

(3) In a similar manner, run 11 more 2-conductor,

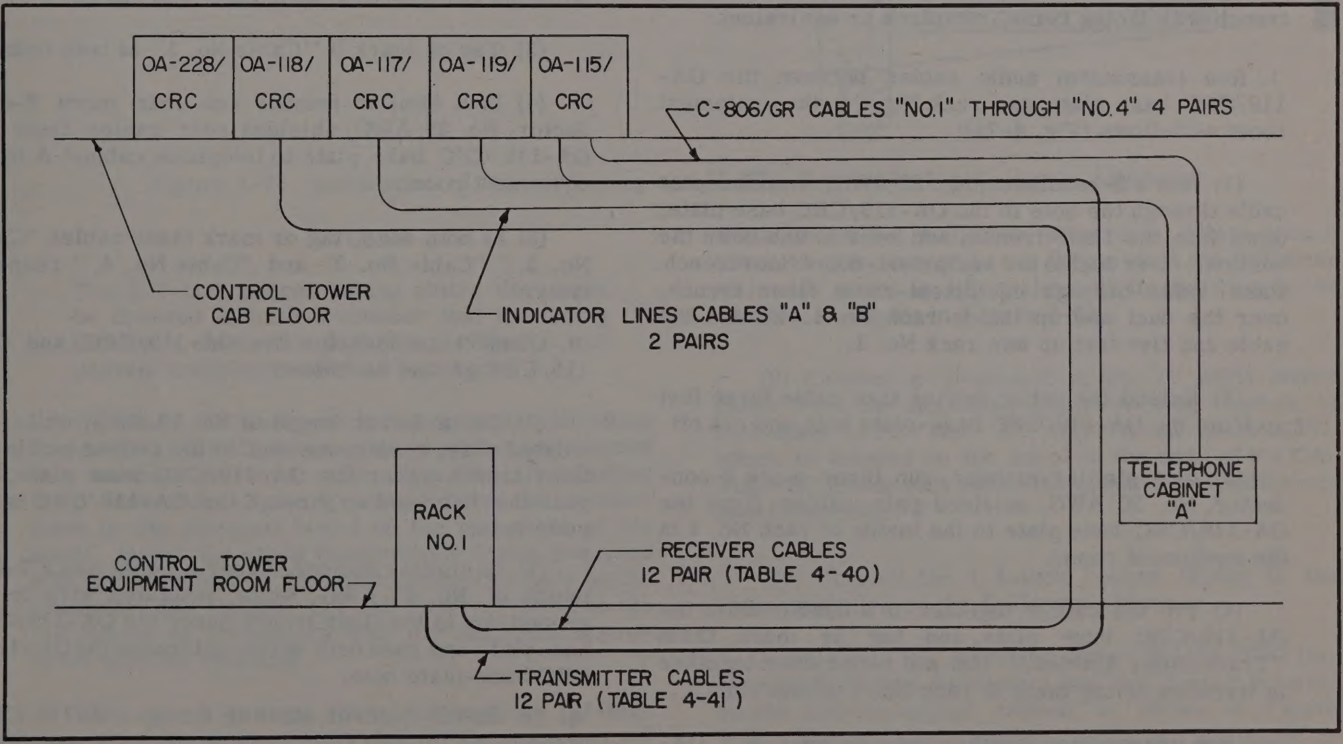

OA-228/ CRC
OA-118/ CRC
OA-117/ CRC
OA-119/ CRC
OA-115/ CRC
C-806/GR CABLES "NO.1" THROUGH "NO.4" 4 PAIRS
CONTROL TOWER CAB FLOOR
INDICATOR LINES CABLES "A" & "B" 2 PAIRS
TELEPHONE CABINET "A"
RACK NO.1
CONTROL TOWER EQUIPMENT ROOM FLOOR
RECEIVER CABLES 12 PAIR (TABLE 4-40)
TRANSMITTER CABLES 12 PAIR (TABLE 4-41)

Figure 4-71. Audio Cabling Between Cab and Equipment Room in Control Tower

No. 20 AWG, shielded-pair cables from the OA-118/-CRC base plate to the inside of rack No. 1 in the equipment room.

(4) Secure the 12 cables together in the floor trenches with lacing twine, wraplock or equivalent.

(5) Tie the cables together in a bundle above the OA-118/CRC base plate and tag or mark this bundle "Receiver Cables."

(6) Tie the cables together in a bundle inside rack No. 1 and tag or mark this bundle "Receiver Cables."

k. Run indicator cables between the OA-117/CRC base plate and telephone cabinet A in the equipment room as follows:

(1) Run a 2-conductor, No. 20 AWG, shielded-pair cable through the hole in the OA-117/CRC base plate, down into the floor trench, over to and down the vertical riser duct, and into telephone cabinet A in the equipment room. Extend the cable end four feet out of the telephone cabinet, and tag or mark it "Indicator Line—Cable A."

(2) Extend the other end of this cable three feet up from the OA-117/CRC base-plate hole, cut it off, and tag or mark it "Indicator Line—Cable A."

(3) In a similar manner, run another 2-conductor, No. 20 AWG, shielded-pair cable from the OA-117/-CRC base plate to the inside of telephone cabinet A in the equipment room. Tag or mark both ends of this cable "Indicator Line—Cable B."

(4) Secure cables A and B together in the floor trench with lacing twine, wraplock or equivalent.

l. Run transmitter audio cables between the OA-119/CRC base plate and rack No. 1 in the equipment room as follows (Fig. 4-71):

(1) Run a 2-conductor, No. 20 AWG, shielded-pair cable through the hole in the OA-119/CRC base plate, down into the floor trench, and over to and down the vertical-riser duct to the equipment-room floor trench. Pass cable through equipment-room floor trench, over the duct and up inside rack No. 1. Extend the cable end five feet up into rack No. 1.

(2) Extend the other end of this cable three feet up from the OA-119/CRC base-plate hole and cut off.

(3) In a similar manner, run three more 2-conductor, No. 20 AWG, shielded-pair cables from the OA-119/CRC base plate to the inside of rack No. 1 in the equipment room.

(4) Tie the cables together in a bundle above the OA-119/CRC base plate, and tag or mark them "Transmitter Cables." (Do not lace cables together in trenches or tag them at rack No. 1 at this time.)

m. Run transmitter audio cables between the OA-115/CRC base plate and rack No. 1 in the equipment room as follows (Fig. 4-71):

(1) As in steps "1(1)" and "1(2)" above, run eight 2-conductor, No. 20 AWG, shielded-pair cables from the OA-115/CRC base plate to the inside of rack No. 1 in the equipment room.

(2) Using lacing twine, wraplock or equal, secure the eight cables of step "m(1)" with the four cables from the OA-119/CRC base and place in the floor trench.

(3) At rack No. 1 in the equipment room tie these 12 cables together in a bundle, and tag or mark them "Transmitter Cables."

(4) Tie together in a bundle above the OA-115/CRC base plate the eight cables of step "m(1)," and tag or mark them "Transmitter Cables."

n. (Deleted)

(1) thru (6) (Deleted)

o. Run the control cable of Control Indicator C-806/GR between the OA-115/CRC base plate and telephone cabinet A in the equipment room, as follows (Fig. 4-71):

(1) Run one 2-conductor, No. 20 AWG, shielded-pair cable from the OA-115/CRC base plate to the inside of telephone cabinet A in the equipment room. Extend the cable end four feet out of the telephone cabinet.

(2) Extend the other end of the cable five feet up from the OA-115/CRC base plate and cut off.

(3) Tag or mark it "Cable No. 1" at both ends.

(4) In a similar manner run four more 2-conductor, No. 20 AWG, shielded-pair cables from the OA-115/CRC base plate to telephone cabinet A in the equipment room.

(5) At both ends, tag or mark these cables "Cable No. 2," "Cable No. 3" and "Cable No. 4," respectively.

p. Connect grounds for the OA-119/CRC and OA-115/CRC groups as follows:

(1) Cut a 4-foot length of No. 12 AWG, white, insulated wire, solder one end to the ground bus in the floor trench under the OA-119/CRC base plate, and pass the other end up through the OA-119/CRC base-plate hole.

(2) In similar manner, solder a 4-foot and a 7-foot length of No. 12 AWG, white, insulated wire to the ground bus in the floor trench under the OA-115/CRC base plate and pass both wires up through the OA-115/-CRC base-plate hole.

q. To install Control Monitor Group OA-115/CRC, proceed as follows (Fig. 4-63, 4-69, 4-72, and Table 4-39):

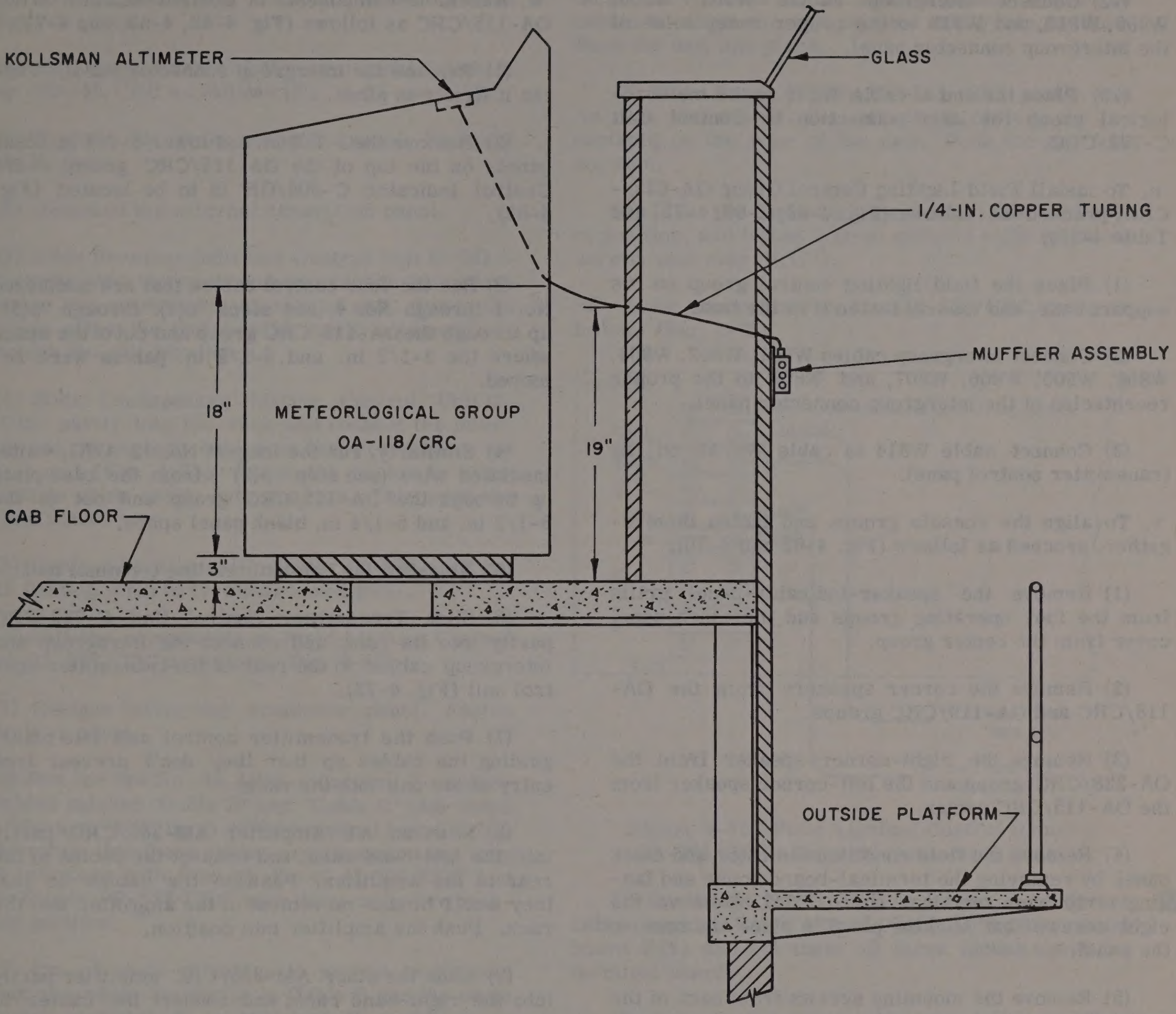


Figure 4-73. Installation of Copper Tubing and Muffler Assembly for Kollsman Altimeter

NOTE

The 1/4-inch copper tubing static line must be dressed in such a manner that the tubing follows a downgrade path (Fig. 4-73); this will prevent trapping condensed moisture.

(7) Mount the Kollsman altimeter to the Mounting Panel SB-419/FRC, keeping the switch and grommet hole on the right-hand side. Pass the illuminating lamp leads through the grommet hole and connect them to the terminal board on the underside of the panel. Insert the elbow compression fitting (supplied with the console) into the static connection hole on the altimeter, and tighten. Set the field elevation on the instrument in accordance with the instructions provided with the indicator.

(8) Leave a gradual slack curve of the 1/4-inch copper tubing inside the OA-118/CRC group, and cut off the tubing at a point where it will reach the fitting installed on the Kollsman altimeter. Allow enough slack to give access to the fitting when the Kollsman altimeter panel is lifted clear of its position in the cabinet, as shown in Figure 4-62.

(9) Connect a 2-conductor, No. 14 AWG power cable from the Kollsman altimeter lamp circuit to terminals ''LTS'' and ''N'' on terminal board E257, which is located on the panel at the rear of the OA-118/CRC group, just below the speaker and indicator-panel assembly.

(10) Connect the 1/4-inch copper tubing to the fitting installed on the Kollsman altimeter.

(11) Install the Mounting Panel SB-419/FRC (including Kollsman altimeter) into the proper position on the meteorological cabinet, as shown in Figure 4-62. The installation of the Kollsman altimeter is now completed.

(12) Connect intergroup cables W801, W808, W809, W810, and W812 to the proper receptacles of the intergroup connector panel.

(13) Place the end of cable W815 in the meteorological group for later connection to Control Unit C-792/CRC.

u. To install Field Lighting Control Group OA-228/-CRC, proceed as follows (Fig. 4-68, 4-69, 4-72, and Table 4-39):

(1) Place the field lighting control group on its support base, and loosely fasten it to the base.

(2) Connect intergroup cables W801, W802, W803, W804, W805, W806, W807, and W808 to the proper receptacles of the intergroup connector panel.

(3) Connect cable W814 to cable No. 18 on the transmitter control panel.

v. To align the console groups and fasten them together, proceed as follows (Fig. 4-62 and 4-70):

(1) Remove the speaker-indicator-panel grills from the four operating groups and the clock-panel cover from the center group.

(2) Remove the corner speakers from the OA-118/CRC and OA-119/CRC groups.

(3) Remove the right-corner speaker from the OA-228/CRC group and the left-corner speaker from the OA-115/CRC group.

(4) Remove the field condition indicator and clock panel by removing the terminal-board cover and fanning strip from terminal board E311. Remove the eight screws that hold the panel in place and remove the panel.

(5) Remove the mounting screws from each of the transmitter control panels; the receiver control panel; the SB-417/FRC Mounting Panel; and the upper panels in the OA-118/CRC, the OA-119/CRC, and the OA-115/CRC groups.

(6) Align the cabinets of the operating groups on the support base, and fasten the groups together by passing machine screws through the matching holes in the sides of the cabinets (Fig. 4-70).

NOTE

The upper rear matching holes are located adjacent to the speaker openings in the corners of the cabinets. The upper front matching holes are located near the operating control panels.

(7) After securely fastening the screws in the sides of the cabinets, tighten the screws that hold the cabinets to the support base.

(8) Replace the speakers and panels removed in steps "v(1)" through "v(5)."

w. Assemble components in Control-Monitor Group OA-115/CRC as follows (Fig. 4-62, 4-63, and 4-72):

(1) Replace the intergroup connector panel. Fasten it firmly in place.

(2) Remove the 3-1/2 in. and lower 5-1/4 in. blank panels on the top of the OA-115/CRC group where Control Indicator C-806/GR is to be located (Fig. 4-62).

(3) Run the four control cables that are numbered No. 1 through No. 4 (see steps "o(1)" through "o(5)" up through the OA-115/CRC group and out of the space where the 3-1/2 in. and 5-1/2 in. panels were removed.

(4) Similarly, run the longest No. 12 AWG, white, insulated wire (see step "p(2)") from the base plate up through the OA-115/CRC group and out of the 3-1/2 in. and 5-1/4 in. blank panel space.

(5) Reinstall the transmitter line terminal unit.

(6) Slide Transmitter Control Unit C-793/CRC partly into its rack, and connect the intragroup and intergroup cables to the rear of the transmitter control unit (Fig. 4-72).

(7) Push the transmitter control unit into place, guiding the cables so that they don't prevent free entry of the unit into the rack.

(8) Slide an AF Amplifier AM-365/CRC partly into the left-hand rack, and connect the cables to the rear of the amplifier. Position the cables so that they won't hinder movement of the amplifier into the rack. Push the amplifier into position.

(9) Slide the other AM-365/CRC amplifier partly into the right-hand rack, and connect the cables to the rear of the amplifier. Slide the amplifier into position, making certain that the cables do not bind against the amplifier chassis.

x. Install the components of Communications Group OA-119/CRC as follows (Fig. 4-65 and 4-72):

(1) Replace the intergroup connector panel. Fasten it firmly in place.

(2) Replace the auxiliary transmitter line terminal unit removed in step "c(4)." Fasten it firmly in place with four mounting screws.

(3) Slide Transmitter Control Unit C-1525/FRC partly into its rack. Connect the intergroup cables and the cable of the auxiliary transmitter line terminal unit to the rear of the transmitter control unit (Fig. 4-72). Slide the transmitter control unit into position, at the same time dressing the cables so they do not bind.

y. Install the components of Flight Data Indicator Group OA-117/CRC as follows (Fig. 4-66):

(1) Replace intergroup connector panel. Fasten it firmly in place.

z. Install the components of Meteorological Indicator Group OA-118/CRC as follows (Fig. 4-67 and 4-72):

(1) Replace intergroup connector panel. Fasten it firmly in place.

(2) Reinstall the external connection panel.

(3) Slide Receiver Indicator Control Unit C-791/-CRC partly into the rack and connect the intragroup cables to the receptacles on rear of unit. Dress the cables to allow the unit to slide easily into position. Then push the unit into place.

(4) Slide Loudspeaker Muting Control Unit C-792/CRC partly into the rack and connect the intergroup and intragroup cables to the receptacles on rear of unit (Fig. 4-72). Dress the cables to allow the unit to slide easily into position. Then push the unit into place.

(5) Replace Aerological Indicator ID-296/CRC and attach fanning strip to terminal board E281.

aa. Install the components of Field Lighting Control Group OA-228/CRC as follows (Fig. 4-68):

(1) Replace intergroup connector panel. Fasten it firmly in place.

(2) Run the two No. 14 AWG or larger, 2-conductor cables marked "Cable B" and "Cable C" (see steps "h(4)" through "h(9)" up to power terminal board E157. Make certain that these cables are located so that they won't interfere with Control Panel C-796/CRC and Power Supply PP-523/CRC when these units are pushed into position.

(3) Cut off ends of cables to proper length, and connect the white conductor in Cable B and the white conductor in Cable C to terminal N, as shown in Figure 4-74.

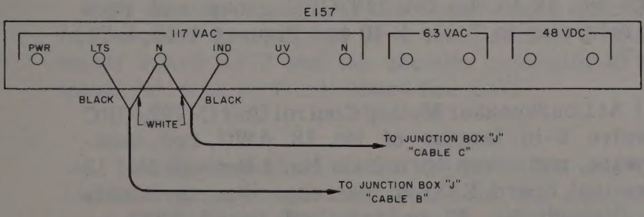


Figure 4-74. Field Lighting Control Group OA-228/CRC—Power Terminal Board

(4) Connect the black conductor in Cable B to LTS (Fig. 4-74).

(5) Connect the black conductor in Cable C to IND (Fig. 4-74).

(6) Slide Control Panel C-796/CRC partly into the rack and connect the intragroup cables to the receptacles on the rear of the control panel. Dress the cables to allow the unit to slide easily into position. Push the unit into place.

(7) Slide Power Supply PP-523/CRC partly into its rack and connect the intragroup cable to the receptacle on the rear of the unit. Push the unit into position.

(8) Place the Field Lighting Control Adaptor Panel in position, and fasten it down with the eight mounting screws (see step "f(1)").

ab. Make connections in the OA-228/CRC group as follows (Fig. 4-75):

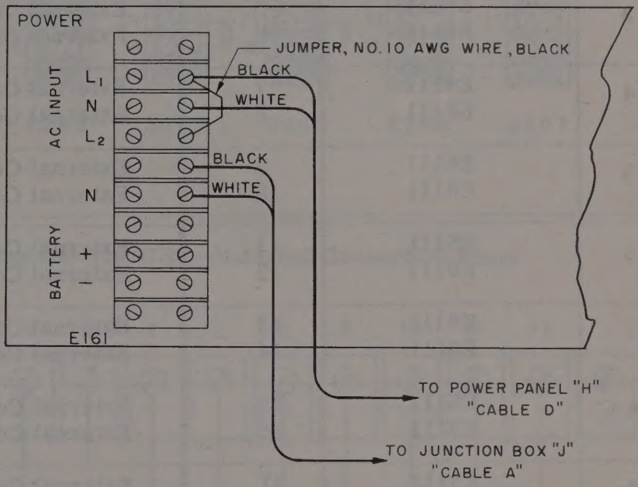

POWER
JUMPER, NO. 10 AWG WIRE, BLACK
AC INPUT
L_1
N
L_2
BLACK
WHITE
BLACK
WHITE
N
BATTERY
+
—
E161
TO POWER PANEL "H" "CABLE D"
TO JUNCTION BOX "J" "CABLE A"

Figure 4-75. Field Lighting Control Group OA-228/CRC—External Connection Panel

(1) Run the two No. 14 AWG or larger, 2-conductor cables marked "Cable A" and "Cable D" up to terminal board E161 and cut them off three inches above the terminal board.

(2) Connect the black conductor of Cable D to terminal L_1. Connect the white conductor of Cable D to terminal N.

(3) Connect the black conductor of Cable A to the unmarked terminal just below terminal L_2 (Fig. 4-75). Connect the white conductor of Cable A to the lower terminal N.

(4) Remove a 4-in. length of No. 10 AWG, black wire from a discarded piece of 2-conductor cable and connect between terminals L_1 and L_2 on terminal board E161.

ac. Make connections in the OA-118/CRC group and rack No. 1 in the control-tower equipment room as follows (Fig. 4-71 and Table 4-40):

(1) Run continuity test and tag both ends of the twelve 2-conductor, No. 20 AWG, shielded-pair cables (marked "Receiver Cables") that run between the OA-118/CRC group and rack No. 1 in the equipment room.

TABLE 4-40

RECEIVER CABLE CONNECTIONS BETWEEN RACK NO. 1 (CONTROL-TOWER EQUIPMENT ROOM) AND METEOROLOGICAL INDICATOR GROUP OA-118/CRC (CONTROL-TOWER CONSOLE)

RACK NO. 1			METEOROLOGICAL GROUP OA-118/CRC		
Pair	Terminal Board	Terminal	Equipment	Terminal Board	Terminal
1	E6111	1	External Connection Panel	E262	1
	E6111	2	External Connection Panel	E262	1_L
2	E6111	3	External Connection Panel	E262	2
	E6111	4	External Connection Panel	E262	2_L
3	E6111	5	External Connection Panel	E262	3
	E6111	6	External Connection Panel	E262	3_L
4	E6111	7	External Connection Panel	E262	4
	E6111	8	External Connection Panel	E262	4_L
5	E6111	9	External Connection Panel	E262	5
	E6111	10	External Connection Panel	E262	5_L
6	E6111	11	External Connection Panel	E262	6
	E6111	12	External Connection Panel	E262	6_L
7	E6111	13	External Connection Panel	E263	7
	E6111	14	External Connection Panel	E263	7_L
8	E6111	15	External Connection Panel	E263	8
	E6111	16	External Connection Panel	E263	8_L
9	E6111	17	External Connection Panel	E263	9
	E6111	18	External Connection Panel	E263	9_L
10	E6112	1	External Connection Panel	E263	10
	E6112	2	External Connection Panel	E263	10_L
11	E6112	3	External Connection Panel	E263	11
	E6112	4	External Connection Panel	E263	11_L
12	E6112	5	External Connection Panel	E263	12
	E6112	6	External Connection Panel	E263	12_L

(2) At the OA-118/CRC group prepare the end of cable pair No. 1 by cutting back the outer braid, removing the insulation from the two conductors (approximately 1/2-in. back from ends), and tinning the bare ends with solder.

(3) Connect the color-coded conductor to terminal No. 1 on terminal board E262 and the uncoded conductor to terminal No. 1_L on terminal board E262 (Fig. 4-76).

(4) At rack No. 1 in the equipment room prepare end of cable pair No. 1 as in step "ac(2)."

(5) Connect the color-coded conductor to terminal No. 1 on terminal board E6111 and the uncoded conductor to terminal No. 2 on terminal board E6111 (Fig. 4-13).

(6) Similarly, connect receiver cable pairs No. 2 through No. 12 to the OA-118/CRC group and rack No. 1, referring to Table 4-40 and Figures 4-13, 4-71, and 4-76.

(7) At Loudspeaker Muting Control Unit C-792/CRC cut twelve 6-in. lengths of No. 18 AWG, red, insulated wire, and strap terminals No. 1 through No. 12 on terminal board E231 to corresponding terminals No. 1 through No. 12 on terminal board E232, as shown in Figure 4-77.

ad. Make cable connections to the OA-117/CRC group in the control-tower cab as follows:

(1) At the OA-117/CRC group connect the color-coded conductor of Indicator Line—Cable A to terminal No. 1 on terminal board E372 and the uncoded conductor to terminal No. 2 on terminal board E372 (see step "k").

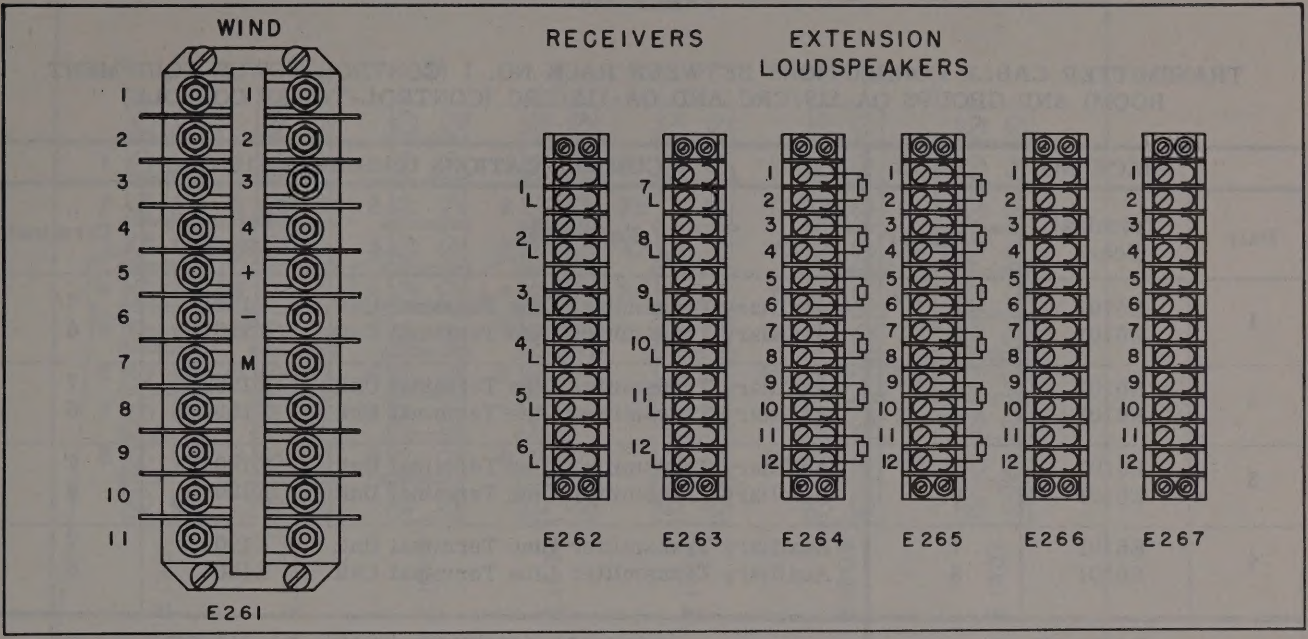

WIND
RECEIVERS
EXTENSION LOUDSPEAKERS
1
2
3
4
5
6
7
8
9
10
11
1
2
3
4
+
−
M
1L
2L
3L
4L
5L
6L
7L
8L
9L
10L
11L
12L
E261
E262
E263
E264
E265
E266
E267

Figure 4-76. Meteorological Indicator Group OA-118/CRC—External Connection Panel

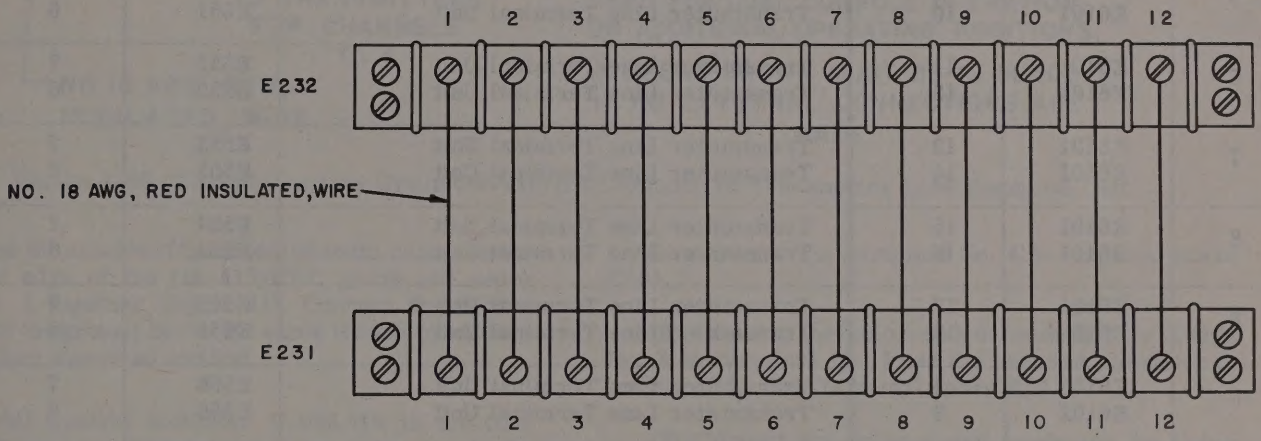

1 2 3 4 5 6 7 8 9 10 11 12
E232
NO. 18 AWG, RED INSULATED, WIRE
E231
1 2 3 4 5 6 7 8 9 10 11 12

Figure 4-77. Loudspeaker Muting Control Unit C-792/CRC—Terminal Board Connections

(2) Similarly, connect the color-coded conductor of Indicator Line—Cable B to terminal No. 3 on terminal board E372 and the uncoded conductor to terminal No. 4 on terminal board No. E372.

ae. Make connections in the OA-119/CRC and OA-115/CRC groups and rack No. 1 in the equipment room as follows (Fig. 4-13, 4-78, 4-79, and Table 4-41):

(1) Run continuity test and tag both ends of the twelve 2-conductor, No. 20 AWG, shielded-pair cables (marked "Transmitter Cables") that run between rack No. 1 in the equipment room and the OA-119/CRC and OA-115/CRC groups. (Numbered scotch tape is supplied for tagging cable ends.)

(2) At the OA-119/CRC group connect the color-coded conductor of cable pair No. 1 to terminal No. 7 on terminal board E1901 and the uncoded conductor on terminal No. 6 on terminal board E1901.

(3) At rack No. 1 in the equipment room connect the color-coded conductor of cable pair No. 1 to terminal No. 1 on terminal board E6101 and the uncoded conductor to terminal No. 2 on terminal board E6101.

(4) Similarly, connect transmitter cable pairs No. 2 through No. 4 to the OA-119/CRC group and rack No. 1 (Fig. 4-13 and 4-78 and Table 4-41).

(5) Connect transmitter cable pairs No. 5 through No. 12 to the OA-115/CRC group and rack No. 1 (Fig. 4-13 and 4-79 and Table 4-41).

(6) At the OA-119/CRC group cut four 3-in. lengths of No. 18 AWG, red, insulated wire, and connect terminal No. 3 to terminal No. 5 on terminal boards E1901, E1902, E1903, and E1904, respectively.

TABLE 4-41

TRANSMITTER CABLE CONNECTIONS BETWEEN RACK NO. 1 (CONTROL-TOWER EQUIPMENT ROOM) AND GROUPS OA-119/CRC AND OA-115/CRC (CONTROL-TOWER CONSOLE)

RACK NO. 1			COMMUNICATIONS GROUP OA-119/CRC		
Pair	Terminal Board	Terminal	Equipment	Terminal Board	Terminal
1	E6101 E6101	1 2	Auxiliary Transmitter Line Terminal Unit Auxiliary Transmitter Line Terminal Unit	E1901 E1901	7 6
2	E6101 E6101	3 4	Auxiliary Transmitter Line Terminal Unit Auxiliary Transmitter Line Terminal Unit	E1902 E1902	7 6
3	E6101 E6101	5 6	Auxiliary Transmitter Line Terminal Unit Auxiliary Transmitter Line Terminal Unit	E1903 E1903	7 6
4	E6101 E6101	7 8	Auxiliary Transmitter Line Terminal Unit Auxiliary Transmitter Line Terminal Unit	E1904 E1904	7 6
RACK NO. 1			CONTROL-MONITOR GROUP OA-115/CRC		
5	E6101 E6101	9 10	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E551 E551	7 6
6	E6101 E6101	11 12	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E552 E552	7 6
7	E6101 E6101	13 14	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E553 E553	7 6
8	E6101 E6101	15 16	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E554 E554	7 6
9	E6101 E6101	17 18	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E555 E555	7 6
10	E6102 E6102	1 2	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E556 E556	7 6
11	E6102 E6102	3 4	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E557 E557	7 6
12	E6102 E6102	5 6	Transmitter Line Terminal Unit Transmitter Line Terminal Unit	E558 E558	7 6

(7) At the OA-115/CRC group cut eight 3-inch lengths of No. 18 AWG, red, insulated wire, and connect terminal No. 3 to terminal No. 5 on terminal boards E551 through E558, respectively.

(8) At the OA-119/CRC group connect the No. 14 AWG, white, insulated wire (ground) to terminal No. 8 on terminal board E1904 (Fig. 4-78).

(9) Cut three short lengths of No. 14 AWG, white, insulated wire. Connect the four No. 8 terminals together on terminal boards E1901, E1902, E1903, and E1904, thereby grounding all four of these terminals to the ground bus in the floor trench.

(10) At the OA-115/CRC group connect the short No. 14 AWG, white, insulated wire (ground) to terminal No. 8 on terminal board E558 (Fig. 4-79).

(11) As in step "ae(9)," connect together the No. 8 terminals on terminal boards E551 through E558 with No. 14 AWG, white, insulated wire, thereby grounding these terminals to the ground bus in the floor trench.

(12) and (13) (Deleted) ■

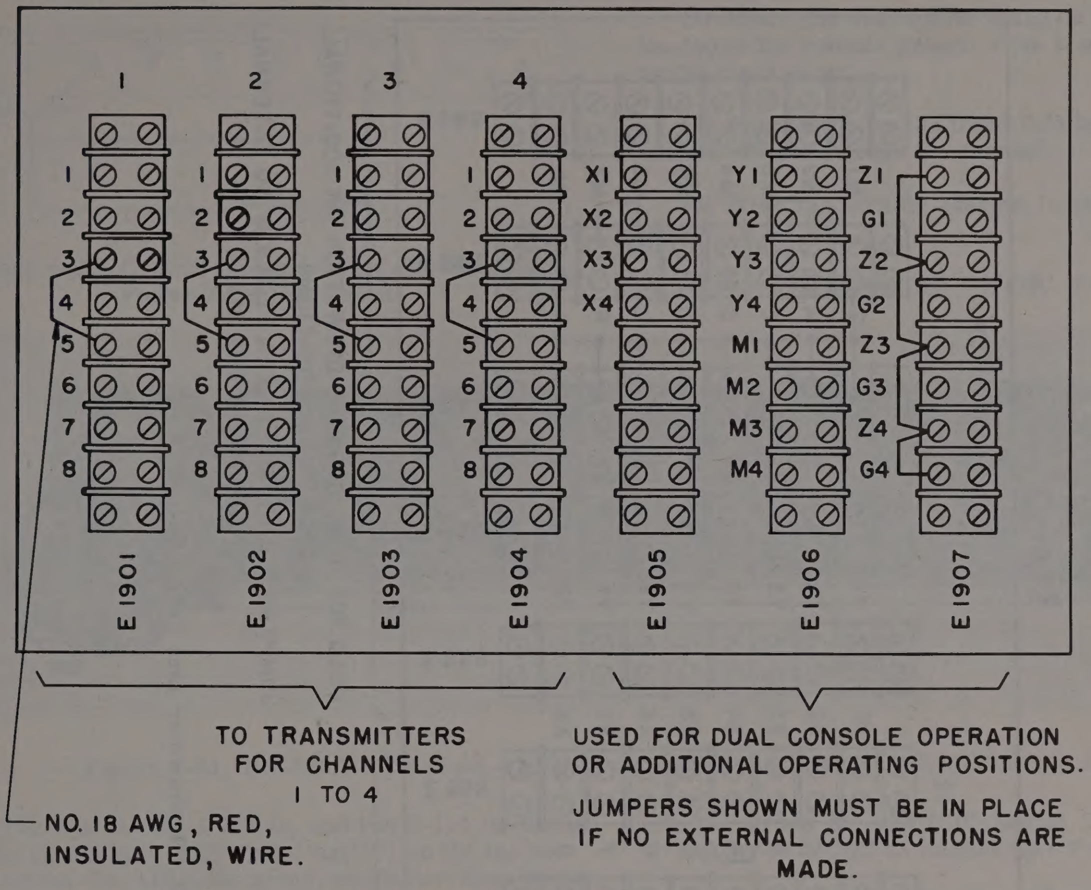

1
2
3
4
1 2 3 4 5 6 7 8
X1 X2 X3 X4
Y1 Y2 Y3 Y4 M1 M2 M3 M4
Z1 G1 Z2 G2 Z3 G3 Z4 G4
E1901
E1902
E1903
E1904
E1905
E1906
E1907
TO TRANSMITTERS FOR CHANNELS 1 TO 4
USED FOR DUAL CONSOLE OPERATION OR ADDITIONAL OPERATING POSITIONS.
JUMPERS SHOWN MUST BE IN PLACE IF NO EXTERNAL CONNECTIONS ARE MADE.
NO. 18 AWG, RED, INSULATED, WIRE.

Figure 4-78. Communications Group OA-119/CRC—Auxiliary Transmitter Line Terminal Unit

af. Bend the shields of the shielded audio cables under the right edge of the OA-115/CRC group and under rack No. 1 together (fig. 4-71). Connect the bonded shields to the ground bus in the cable trench by soldering or other approved method.

ag. Install Control Indicator C-806/GR in the OA-115/CRC group as follows:

(1) Remove the remaining 1-3/4 in. and 5-1/4 in. blank panels from the top surface of the OA-115/CRC group to permit installation of Control Indicator C-806/GR.

(2) Remove the rear cover from the control indicator.

(3) Connect the No. 14 AWG, white, insulated wire (ground) that extends out of the top of the OA-115/-CRC group to terminal No. 1 of terminal board E501, which is located on the control indicator.

(4) Connect the color-coded conductor in the cable marked "Cable No. 1" (see steps "o(1)" through "o(3)") to terminal No. 3 on terminal board E501 of the C-806/GR indicator. Connect the uncoded conductor to terminal No. 2.

(5) Connect the color-coded conductor in cable marked "Cable No. 2" to terminal No. 5 and the uncoded conductor to terminal No. 4 on terminal board E501.

(6) Connect the color-coded conductor in Cable No. 3 to terminal No. 7 and the uncoded conductor to terminal No. 6 on terminal board E501.

(7) Connect the color-coded conductor in Cable No. 4 to terminal No. 9 and the uncoded conductor to terminal No. 8 on terminal board E501.

(8) thru (11) (Deleted)

(12) Cut a 2-foot length of No. 14 AWG power cable. Connect the black conductor to terminal PWR and the white conductor to terminal N on power-terminal-board E586 (Fig. 4-80).

(13) At the other end of this cable connect the white conductor to terminal No. 21 and the black conductor to terminal No. 22 on terminal board E502 of the C-806/GR indicator.

(14) Replace the rear cover on Control Indicator C-806/GR.

(15) Mount the indicator in the top of the OA-115/-CRC group just above the Transmitter Control Panel, in the position shown in Figure 4-62. Fasten it down firmly with four mounting screws.

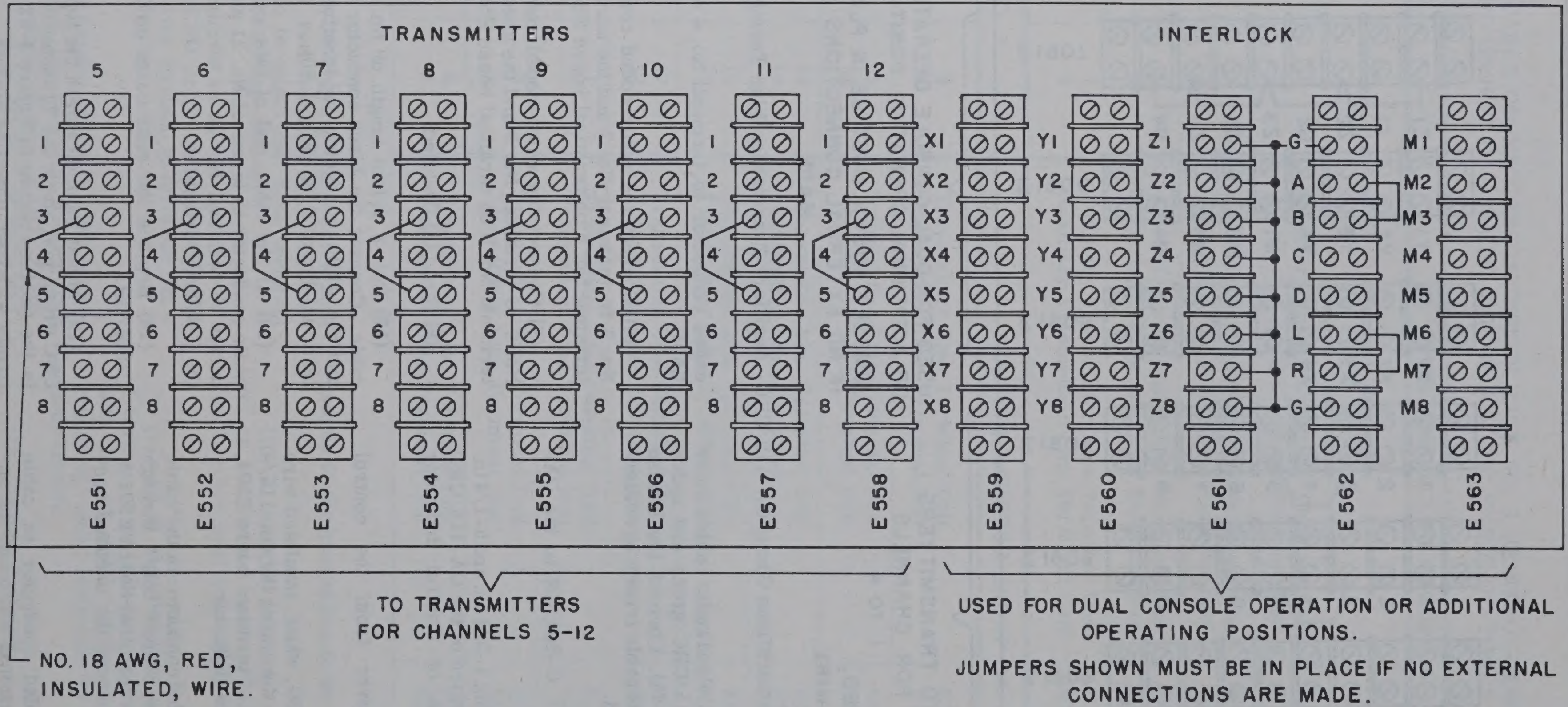

TRANSMITTERS
INTERLOCK
5
6
7
8
9
10
11
12
1
2
3
4
5
6
7
8
X1
X2
X3
X4
X5
X6
X7
X8
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y8
Z1
Z2
Z3
Z4
Z5
Z6
Z7
Z8
G
A
B
C
D
L
R
G
M1
M2
M3
M4
M5
M6
M7
M8
E 551
E 552
E 553
E 554
E 555
E 556
E 557
E 558
E 559
E 560
E 561
E 562
E 563
TO TRANSMITTERS FOR CHANNELS 5-12
USED FOR DUAL CONSOLE OPERATION OR ADDITIONAL OPERATING POSITIONS.
JUMPERS SHOWN MUST BE IN PLACE IF NO EXTERNAL CONNECTIONS ARE MADE.
NO. 18 AWG, RED, INSULATED, WIRE.

Figure 4-79. Control Monitor Group OA-115/CRC—Transmitter Line Terminal Unit

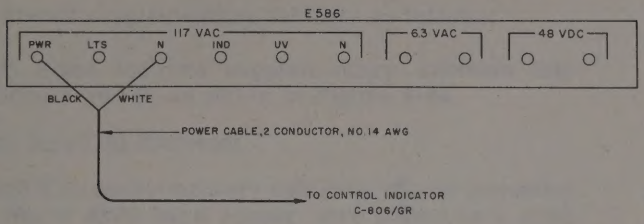

E 586
117 VAC
63 VAC
48 VDC
PWR
LTS
N
IND
UV
N
BLACK
WHITE
POWER CABLE,2 CONDUCTOR, NO.14 AWG
TO CONTROL INDICATOR
C-806/GR

Figure 4-80. Control Monitor Group OA-115/CRC—Power Terminal Board

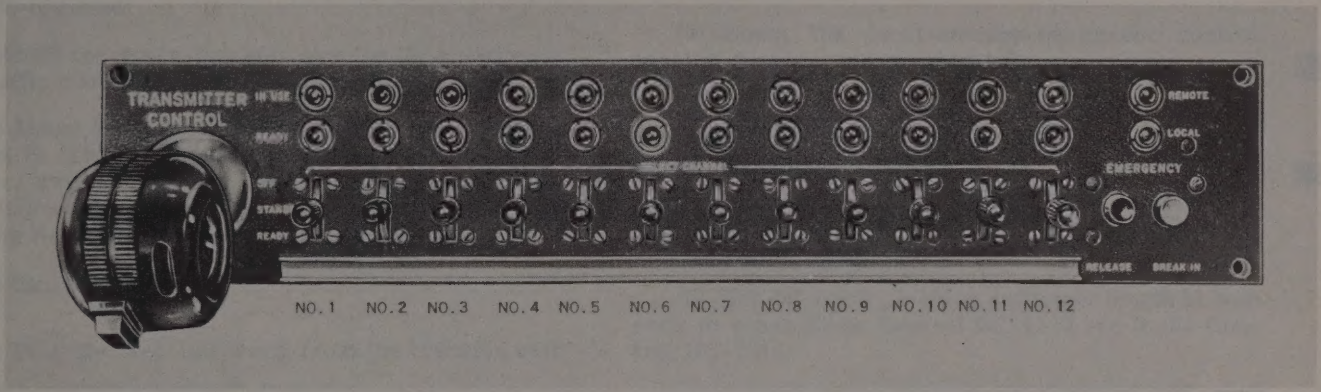

TRANSMITTER CONTROL
IN USE
READY
SELECT CHANNEL
OFF
STANDBY
READY
REMOTE
LOCAL
EMERGENCY
RELEASE
BREAK-IN
NO. 1
NO. 2
NO. 3
NO. 4
NO. 5
NO. 6
NO. 7
NO. 8
NO. 9
NO. 10
NO. 11
NO. 12

Figure 4-81. OA-228/CRC and OA-115/CRC Groups—Transmitter Control Panels A and B

(16) Replace the 1-3/4 in. and two 5-1/4 in. blank panels (see steps "w(3)" and "ag(1)") on the top surface of the OA-115/CRC group, and fasten them down firmly.

ah. At Field Lighting Control Group OA-228/CRC turn all circuit breakers on Control Panel C-796/CRC to OFF.

ai. Replace field cable guide plates in the OA-228/-CRC, OA-118/CRC, OA-117/CRC, OA-119/CRC, and OA-115/CRC console groups.

aj. Replace front covers on each of the five console groups (see Fig. 1-23).

ak. Mount Flight Data Board PT-102/U on Flight Data Indicator Group OA-117/CRC as follows (see Fig. 1-23):

(1) Place the flight data board on the channels at the top of the console group. Push it under the flange on the clock panel.

(2) Push down on the flight data board so that its studs protrude through the channel.

(3) Slide the locking clamps in place under the board.

al. Mount a Log Desk FN-80/FRC on Field Lighting Control Group OA-228/CRC and on Control-Monitor Group OA-115/CRC as follows (see Fig. 1-23):

(1) Place the log desk in position, engaging the cleat on the back edge of the desk with the front top edge of the console cabinet.

(2) Lock the log desk in place by tightening the two winged-head springlock fasteners located on the desk brackets.

am. Mount Log Desk FN-82/FRC on Meteorological Indicator Group OA-118/CRC as in step "al."

an. Mark or identify designation strips under each switch on transmitter control panel A, transmitter control panel B, and the receiver control panel, as shown in Figures 4-81 and 4-82, respectively.

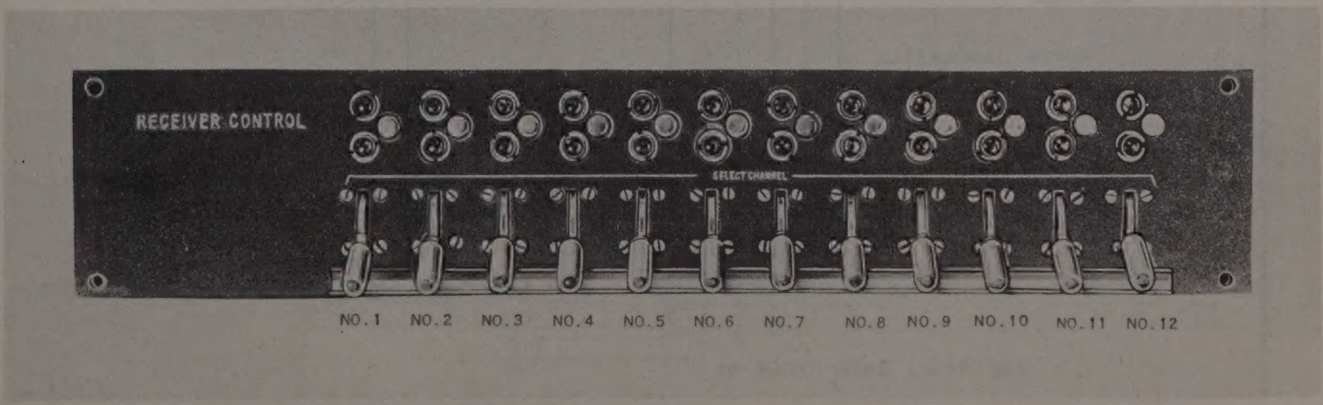

RECEIVER CONTROL
SELECT CHANNEL
NO. 1
NO. 2
NO. 3
NO. 4
NO. 5
NO. 6
NO. 7
NO. 8
NO. 9
NO. 10
NO. 11
NO. 12

Figure 4-82. OA-118/CRC Group—Receiver Control Panel

All data deleted from page 146
Figure 4-83. (Deleted)

ao. Install supplementary cabinets as follows:

(1) Place the two supplementary cabinets into positions A and B, as shown in Figure 4-69.

(2) thru (17) (Deleted)

(18) The supplementary cabinets will be grounded with No. 6 AWG bare copper wire bolted to a steel angle inside the cabinet and soldered to the ground bus inside the cable trench.

(19) (Deleted)

ap. Install the power-transfer unit for the emergency air traffic control lamps as follows (Fig. 4-69):

(1) Mount the power-transfer unit in supplementary cabinet B. (This unit consists of battery, relay, transformer, switch, indicator light and terminal strip locally fabricated in accordance with details outlined in drawing NAV-4016 (2 sheets) and Figure 4-84.)

(2) thru (4) (Deleted)

(5) Plug the a-c line cord from the transfer unit into a receptacle in the junction box that is located on the wall behind the cabinet.

aq. Install and connect the control panel for local standby equipment as follows:

(1) Mount and connect Radio Control BC-1314 and Radio Set Control C-628/ARC-27 to the control panel for local standby equipment in accordance with Dwg. No. NAV-4010.

(2) (Deleted)

(3) Mount the local-standby-equipment control panel in supplementary cabinet B.

(4) Run a special-purpose cable (ten No. 20 AWG conductors, stock No. 1B3016-10.2) from the local-standby-equipment control panel, through the floor trench and vertical duct system, to Radio Control BC-1312, which is located in rack No. 5 in the equipment room (Fig. 4-52).

(5) Cut off cable, leaving sufficient length at both ends to reach Radio Control BC-1312 and Radio Control BC-1314.

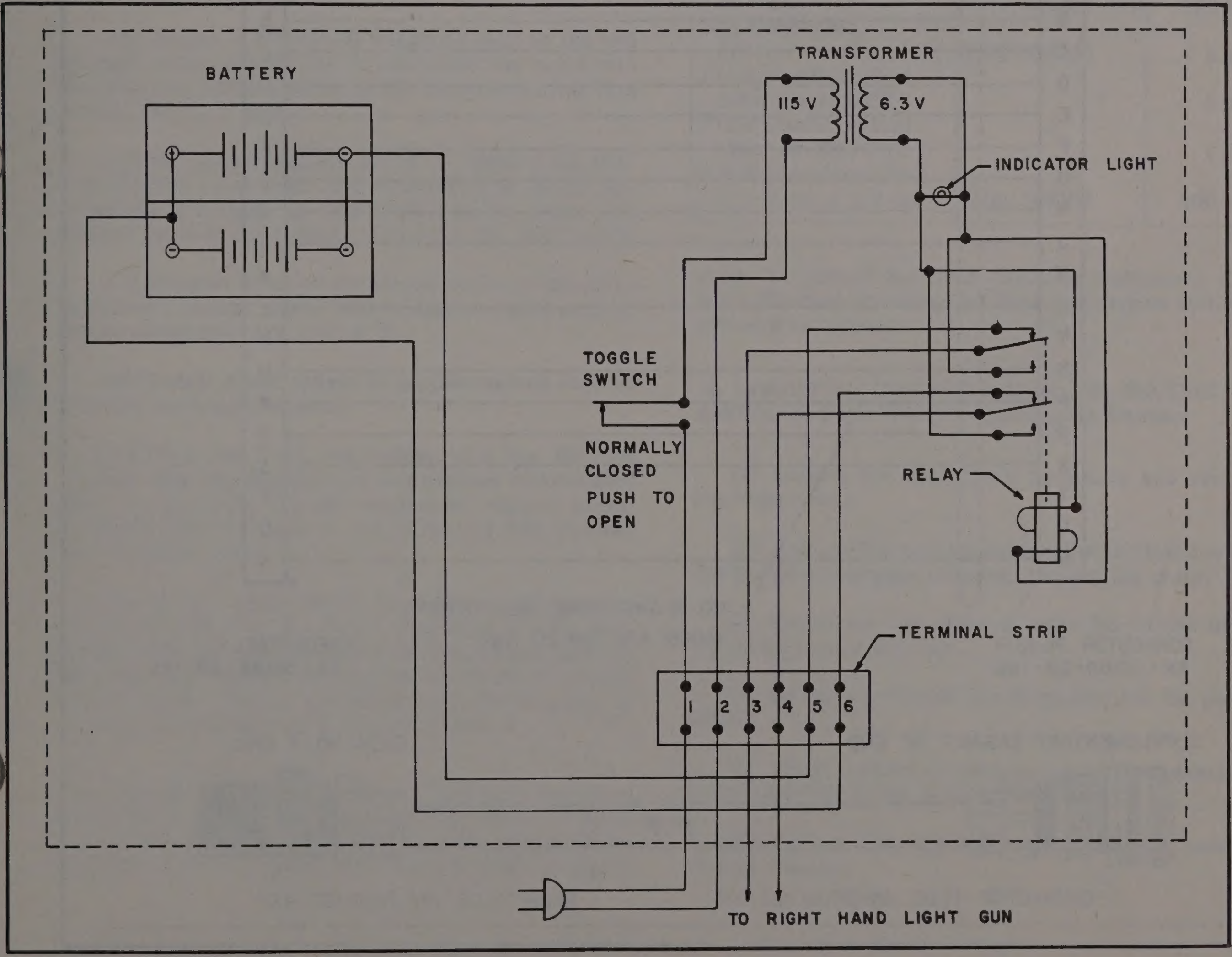


Figure 4-84. Schematic Wiring Diagram for Emergency Control Lamp Power Transfer Unit

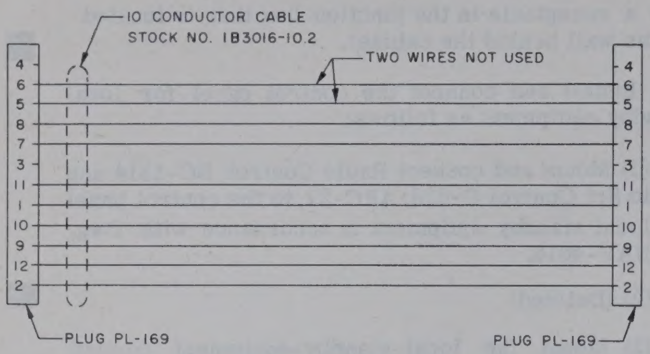

10 CONDUCTOR CABLE
STOCK NO. 1B3016-10.2
TWO WIRES NOT USED
4
6
5
8
7
3
11
1
10
9
12
2
PLUG PL-169
PLUG PL-169

Figure 4-85. Cable Connections to PL-169 Plugs

(6) Connect a PL-169 plug to each end of cable, as shown in Figure 4-85.

(7) Connect the PL-169 plugs on this cable into Radio Control BC-1312 in rack No. 5 and into Radio Control BC-1314 mounted on the local-standby-equipment control panel, as shown in Figure 4-52.

(8) Run a special-purpose cable (14 No. 20 AWG and 1 No. 16 AWG conductors, stock No. 1B3020-15) from the local-standby-equipment control panel, through the floor trench and vertical duct system, to the inside of rack No. 4 in the equipment room (Fig. 4-51).

(9) Cut off cable leaving sufficient length at both ends to reach Radio Set Control C-628/ARC-27 and the W-201 terminal in the Interconnecting Box J-499/GRC.

(10) Assemble a plug and receptacle to the ends of the cable, as shown in Figure 4-86. Make sure that receptacle AN/3108B-22-14P is installed on the cable end in rack No. 4.

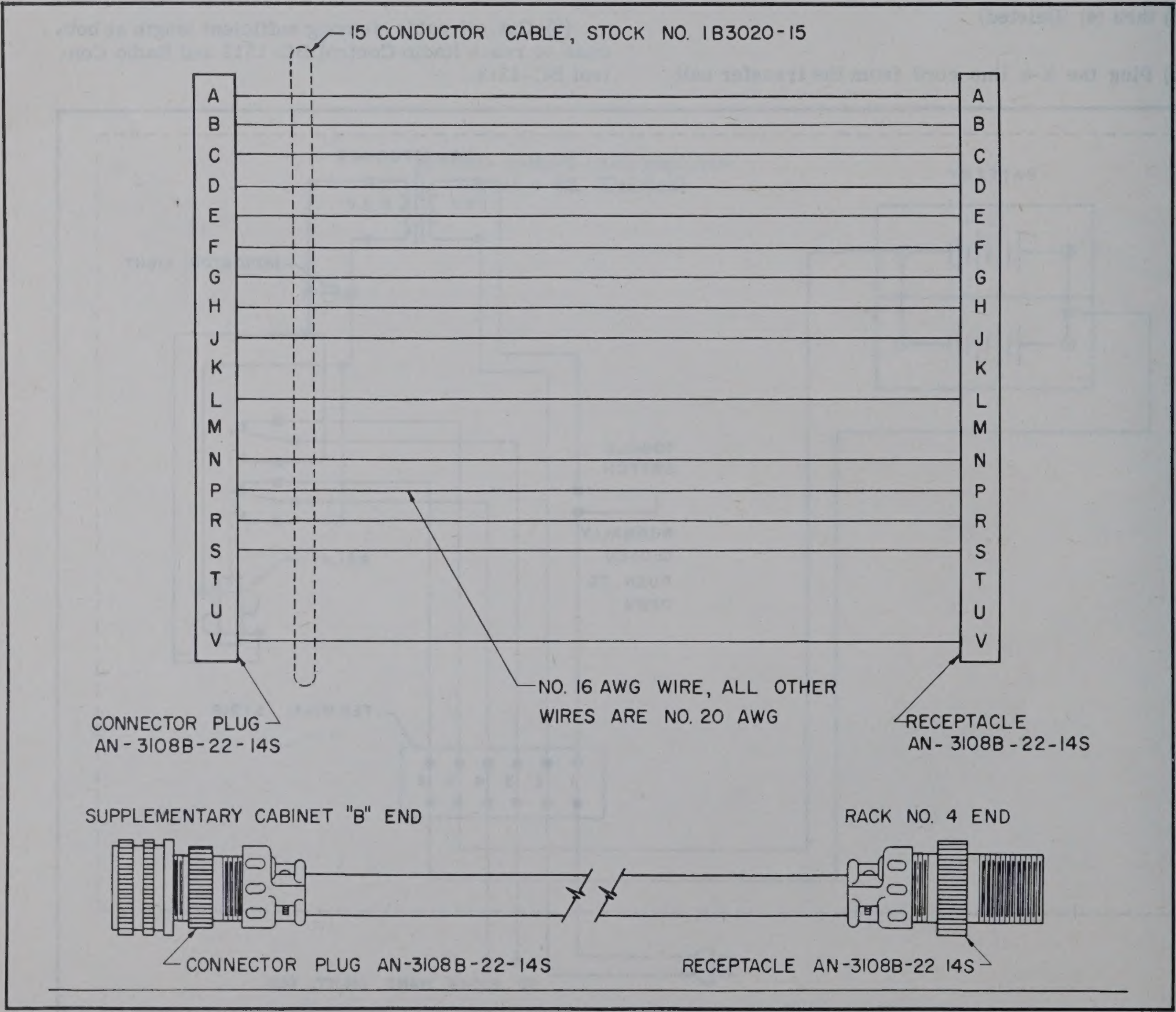

15 CONDUCTOR CABLE, STOCK NO. 1B3020-15
A
B
C
D
E
F
G
H
J
K
L
M
N
P
R
S
T
U
V
NO. 16 AWG WIRE, ALL OTHER WIRES ARE NO. 20 AWG
CONNECTOR PLUG AN-3108B-22-14S
RECEPTACLE AN-3108B-22-14S
SUPPLEMENTARY CABINET "B" END
RACK NO. 4 END
CONNECTOR PLUG AN-3108B-22-14S
RECEPTACLE AN-3108B-22 14S

Figure 4-86. Cable Assembly

(11) Insert and secure the AN-3108B-22-14P in the position formerly occupied by the W-201 cable in the Interconnecting Box, J-499/GRC, as shown in Figure 4-51.

(12) At Supplementary cabinet B connect the AN-3108B-22-14S plug into Radio Set Control C-628/ARC-27, which should be mounted on the local-standby-equipment control panel.

(13) Run two 2-conductor, No. 20 AWG, shielded-pair cables from the local-standby-equipment control panel in supplementary cabinet B through the floor trench and vertical duct system to Interconnecting Box J-499/GRC, which is located in rack No. 4 in the equipment room (Fig. 4-51).

Figure 4-87. (Deleted)

(14) Cut off cables, leaving sufficient length at both ends to reach the local-standby-equipment control panel and the MIC and PHONE jacks on Interconnecting Box J-499/GRC.

(15) Install a PJ-055-B telephone plug on the end of each cable at rack No. 4, and insert the plugs into the MIC and PHONE jacks on the Interconnecting Box J-499/GRC (Fig. 4-51).

(16) At supplementary cabinet B, identify the MIC and PHONE cable ends and connect them to the appropriate terminals on the local-standby-equipment control panel in accordance with Dwg. No. NAV-4010.

(17) Plug the a-c line cord from the local-standby-equipment control panel into a duplex outlet located inside supplementary cabinet B.

(18) Install blank panels in supplementary cabinet B to fill unoccupied space.

(19) Plug the T-17 microphone and the HS-33A headset into the appropriate microphone and headset jacks on the local-standby-equipment control panel. Cord CD-307A is used to adapt the HS-33A headset into the panel jack.

(20) In the cable trenches under supplementary cabinet B and rack No. 4, cut lengths of 1/2-in. wire braid, wrap one end of each piece of braid around the two MIC and PHONE cables, and solder braid to the cable shields. Solder the other end of each piece of braid to the ground bus in the cable trench.

ar. Replace the steel covers on the floor trenches in the control-tower cab and equipment room. Cut off covers as necessary to make them fit flush with the equipment racks, console, and supplementary cabinets located over the trenches.

as. Replace front cover and door on panel H in the control-tower cab.

at. Close the main lighting switch located in the control-tower generating room.

4-51. INSTALLATION OF FIELD CONDITION INDICATORS. (Fig. 4-88 and 4-89.) Table 4-42 lists the material supplied for installation of the field condition indicators.

TABLE 4-42

MATERIAL SUPPLIED FOR INSTALLATION OF FIELD CONDITION INDICATORS

Description	Stock No.	Qty per Installation
Cable, Power, 2-Cond., No. 14 AWG	8860-261000-475	175 ft
Cable, Special-Purpose, 2-Cond., No. 20 AWG	8860-450000-475	400 ft
Box Connector, 1/2-in.	8800-038200	4 ea
Field Condition Indicator ID-203/CRC		1 ea
Field Condition Indicator ID-298/CRC		1 ea
Staple, Insulated, No. 6, 1/4-in. x 3/4-in.	8800-789000	600 ea

4-52. To install the field condition indicators at the Base Weather Building and Base Operations Building, proceed as follows:

a. Install Field Condition Indicator ID-203/CRC (Fig. 4-88) in the Base Weather Building as follows:

(1) Loosen the springlock fasteners and remove the front cover.

(2) Remove the screws holding the lighting chassis and the power-supply chassis; remove the units.

(3) Knock out the desired holes for cables in the top or bottom of the case.

(4) Install a 1/2-inch box connector for the power cable.

(5) Mount cabinet on wall, using the four mounting holes provided in the back of the cabinet.

(6) Replace the lighting chassis and the power-supply chassis.

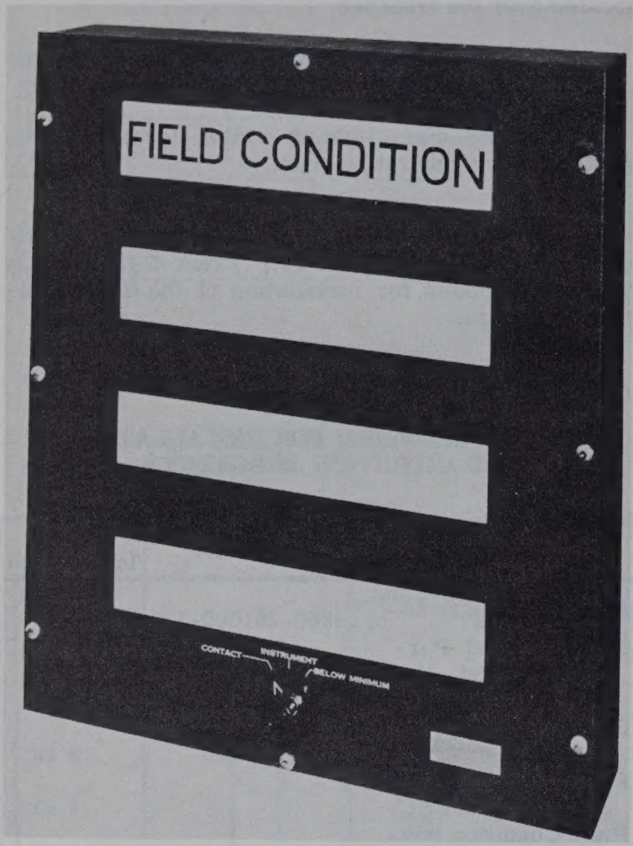


Figure 4-88. Field Condition Indicator ID-203/CRC

(7) Run two 2-conductor, No. 20 AWG, shielded-pair cables from terminal board E1101 in Field Condition Indicator ID-203/CRC to the telephone terminal box in the Base Weather Building. Use insulated staples supplied to attach cables.

(8) At the field condition indicator connect the color-coded conductor of one shielded-pair cable to terminal No. 1 on E1101 and the uncoded conductor to terminal No. 2.

(9) At the telephone terminal box connect the color-coded conductor of the above cable to telephone terminal tagged "Indicator Line No. 1" and the uncoded conductor to telephone terminal tagged "Indicator Line No. 2."

(10) In like manner, connect the color-coded conductor of the remaining shielded-pair cable to terminal No. 3 on E1101 at the field condition indicator and the uncoded conductor to terminal No. 4.

(11) At the telephone terminal box connect the color-coded conductor of the remaining cable to telephone terminal tagged "Indicator Line No. 3" and the uncoded conductor to telephone terminal tagged "Indicator Line No. 4."

(12) Pass a No. 14 AWG power cable through the box connector on the field-condition-indicator chassis.

(13) Connect the power cable to the 117-volt a-c terminals, as shown on the wiring diagram on the inside of the front cover of the field condition indicator, and tighten the box connector.

(14) Replace front cover on field condition indicator.

(15) Run the power cable into a power-distribution panel in the Base Weather Building. Attach cable to distribution panel with a box connector.

WARNING

Make sure that the power switch or circuit breaker that supplies the base-weather distribution panel is OFF before working at this panel.

(16) Connect the white wire of the cable to the distribution-panel neutral (ground bus) and the black wire to a spare circuit-breaker terminal. Turn circuit breaker to ON.

(17) Print "FIELD CONDITION INDICATOR" on the door of the distribution panel to identify the spare circuit breaker that was used.

(18) Return the power switch or circuit breaker (that supplies the base-weather distribution panel) to the ON position.

b. Install Field Condition Indicator ID-298/CRC (Fig. 4-89) in the Base Operations Building as follows:

(1) Loosen the springlock fasteners and remove the front cover.

(2) Remove the screws holding the lighting chassis; remove the chassis.

(3) Knock out the desired holes for cables in the top or bottom of the case.

(4) Install a 1/2-in. box connector for the power cable.

(5) Mount cabinet on wall, using the four mounting holes provided in the back of the cabinet.

(6) Replace the lighting chassis.

(7) Run two 2-conductor, No. 20 AWG, shielded-pair cables from terminal board E1001 in Field Condition Indicator ID-298/CRC to the telephone terminal box in the Base Operations Building. Use insulated staples supplied to attach cables.

(8) At the field condition indicator connect the color-coded conductor of one shielded-pair cable to terminal No. 1 on E1001 and the uncoded conductor to terminal No. 2.

(9) At the telephone terminal box connect the color-coded conductor of the above cable to telephone

"Indicator Line No. 1" and "Indicator Line No. 2" on binding-post chamber No. 2. Cut off cable, leaving sufficient length to make connections to terminals.

(2) Connect the color-coded conductor of Indicator Line—Cable A to terminal tagged "Indicator Line No. 1" and the uncoded conductor to terminal tagged "Indicator Line No. 2."

(3) In like manner, connect the color-coded conductor of Indicator Line—Cable B to terminal tagged "Indicator Line No. 3" and the uncoded conductor to terminal tagged "Indicator Line No. 4."

(4) Connect shielded-pair cables marked "Cable No. 1" through "Cable No. 5" to terminal pairs on binding-post chamber No. 2 in telephone cabinet A, as shown in Table 4-46 and Figure 4-60. Make sure that the color-coded conductor of each cable connects to the right-hand terminal of a terminal pair on binding-post chamber No. 2 and the uncoded conductor connects to the left terminal.

TABLE 4-46

CONTROL-LINE CONNECTIONS IN TELEPHONE CABINET A

*TELEPHONE CABINET A	
Connect Shielded Pair Cable	To Binding Post Chamber No. 2
Cable No. 1	Terminal Pair No. 62
Cable No. 2	Terminal Pair No. 87
Cable No. 3	Terminal Pair No. 11
Cable No. 4	Terminal Pair No. 36
Cable No. 5	Terminal Pair No. 12

*See Figure 4-60.

4-58. TEST PROCEDURES.

NOTE

If the following adjustments cannot be made or the results do not fall within the specified limits, the equipment is defective and should be repaired in accordance with the appropriate T.O. on maintenance. See Paragraph 2-17, "Reference Documents."

4-59. RECEIVER SITE.

4-60. Test the receivers for proper performance according to the following instructions. Follow the order of steps given herein. The required tools and test equipment are indicated in Table 4-47.

4-61. RADIO RECEIVER BC-639. (Fig. 4-90.) Test Radio Receiver BC-639 (rack No. 31) as follows:

a. Prepare the r-f signal generator (Table 4-47) to produce the desired operating frequency, modulated 30 percent with 1,000 cycles per second.

TABLE 4-47

EQUIPMENT AND MATERIALS REQUIRED FOR TESTS AT RECEIVER SITE

Description	Qty	Source
Tools		See par. 4-5
Multimeter TS-352A/U or equivalent	1	See par. 4-5
AF Signal Generator TS-352A/U or equivalent	1	See par. 4-5
RF Signal Generator TS-497B/UUR or equivalent	1	See par. 4-5
Cord, Headset, CD-307	1	See Table 4-8
Headset HS-33	1	See Table 4-8
Telephone Plug PJ-055-B	1	See Table 4-8
Resistor RC20BF681K (680 ohms ±10%, 1/2 watt)	1	See Table 4-8

b. Set the signal generator output control to zero microvolts.

c. Set the signal generator power ON-OFF switch to ON and allow five minutes warm-up time.

d. Connect the output receptacle of signal generator to the antenna input receptacle on rear of receiver, using appropriate r-f cable.

e. Set the function switch of the multimeter (Table 4-47) to read a-c volts and connect test leads to the 3-volts a-c range.

f. Remove the plastic sleeve from Plug PJ-055-B and connect the 680-ohm resistor across the terminals of the plug (Table 4-47).

g. Connect test leads from multimeter across the resistor and insert plug into LINE jack on front panel of the receiver.

h. Set controls on the receiver to the following positions:

(1) ATTENUATION switch to 0 db.

(2) R.F. GAIN INCREASE to maximum clockwise.

(3) AUDIO GAIN INCREASE to maximum counterclockwise.

(4) C.W. AND MANUAL-MANUAL-A.V.C. switch to MANUAL.

i. Set circuit breakers No. 6 and No. 5 in primary power distribution panel G to the ON position. These breakers supply power to racks No. 31 and No. 51, respectively.

NOTE

Racks No. 31 and No. 51 contain a power switch and fuse box inside the cabinet at the bottom left. Make certain these switches are in the ON position.

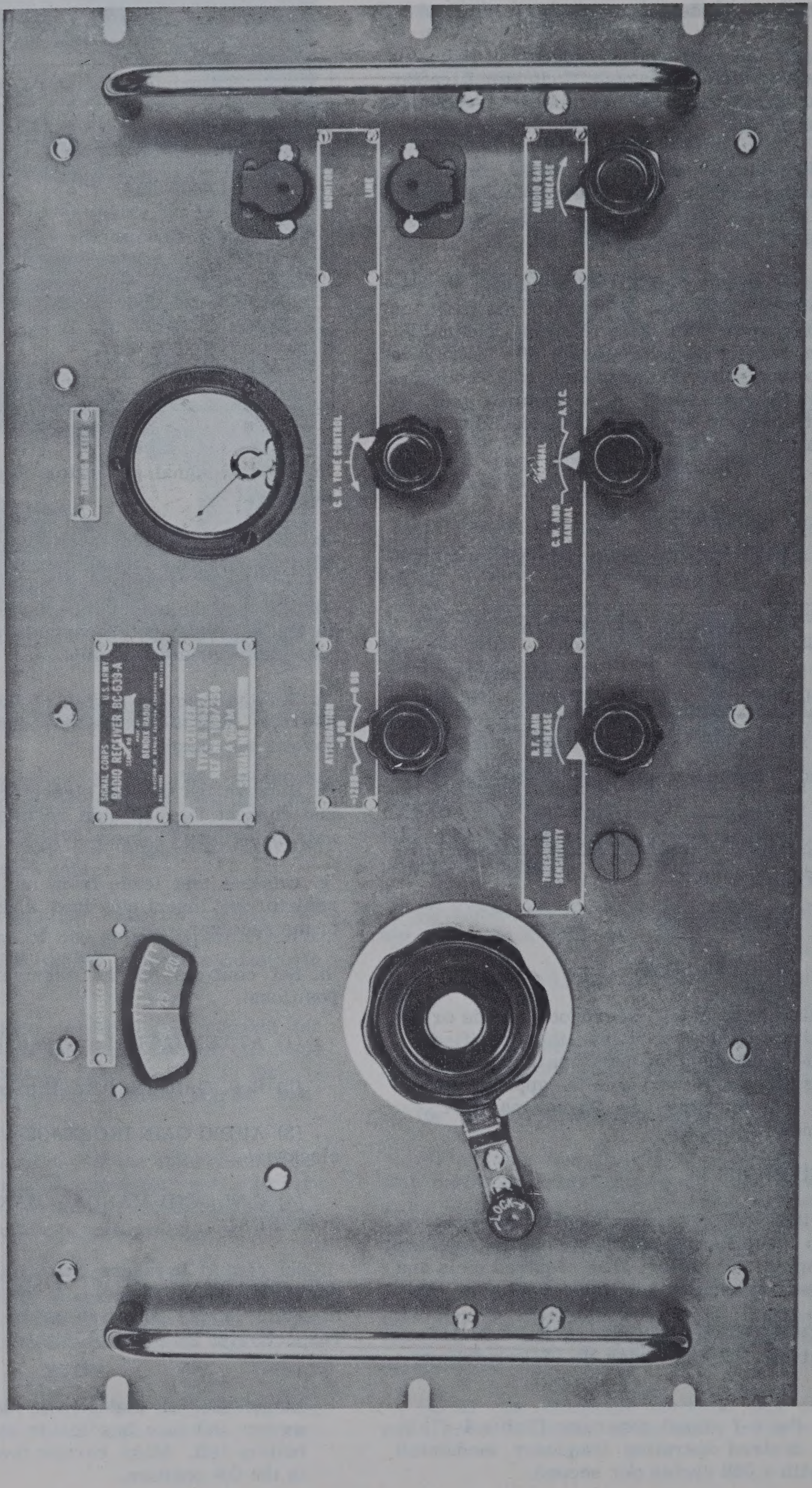

MONITOR
LINE
AUDIO GAIN INCREASE
TUNING METER
C. W. TONE CONTROL
C. W. AND MANUAL
MANUAL
A.V.C.
ATTENUATION
R.F. GAIN INCREASE
THRESHOLD SENSITIVITY
SIGNAL CORPS U.S. ARMY
RADIO RECEIVER BC-639-A
LOCK

Figure 4-90. Radio Receiver BC-639

j. Turn the POWER switch on Rectifier RA-42-B in rack No. 31 to ON. Pilot lamp on rectifier and dial lamp on receiver should light. Adjust SUPPLY VOLTAGE switch for nominal line voltage (115V) and allow five minutes for equipment to warm up.

NOTE

Rectifier RA-42-A and Rectifier RA-42-B are identical, except that the panels of the early models of Rectifier RA-42-A are equipped with a voltmeter and milliammeter.

k. Adjust THRESHOLD SENSITIVITY control on receiver front panel (screwdriver adjustment under the screw cap, which must be removed by hand) until the TUNING METER reading is 5 ma.

l. Check the receiver for a signal-to-noise ratio of 10-to-1 or greater with 10 milliwatts output as follows:

(1) Tune the receiver to approximately the signal generator frequency.

(2) Set the signal generator output (step "a") to 5 microvolts.

(3) Slowly and carefully adjust the AUDIO GAIN INCREASE control for a multimeter reading (receiver output) of 2.61 volts ac (10 mw "signal").

(4) Retune the receiver to the exact frequency of the signal generator as indicated by maximum multimeter reading. Readjust AUDIO GAIN INCREASE control, if necessary, to maintain reading of 2.61 volts obtained in step "1(3)."

(5) Turn off the signal-generator modulation.

NOTE

In some signal generators, the carrier frequency shifts slightly when modulation is applied, which necessitates retuning each time modulation is turned on or off.

(6) Adjust the R.F. GAIN INCREASE control for a multimeter reading of .825 a-c volt (1 mw "noise").

(7) Turn the signal-generator modulation on.

(8) Readjust AUDIO GAIN INCREASE control to again obtain multimeter reading of 2.61 volts ac.

(9) Turn signal-generator modulation off. Multimeter reading should not be greater than .825 volt ac (see note in par. 4-58).

m. Turn the signal-generator modulation on, set output to 5 microvolts, and adjust receiver output as follows:

(1) Turn the C.W. AND MANUAL-MANUAL-A.V.C. switch to A.V.C.

(2) Withdraw plug from LINE jack.

(3) Disconnect resistor but leave multimeter connected to plug.

(4) Insert plug into MONITOR jack.

(5) Adjust AUDIO GAIN INCREASE control to obtain a multimeter reading of 1.89 volts ac (zero-db sound level). Do not again change this audio adjustment as this is the level at which the line is fed.

n. Disconnect the multimeter from the MONITOR jack.

o. At AF Amplifier AM-864/U (rack No. 51) associated with the BC-639 receiver, rotate the Attenuator to the extreme counterclockwise position.

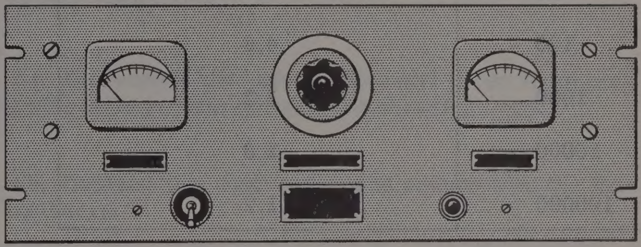


Figure 4-91. AF Amplifier AM-864/U

p. With the test tone feeding the amplifier (step "m(5)") make the following adjustments:

(1) Set the line power switch located on the front panel to the ON position. The indicator lamp should light immediately. In about a half minute the CONTROL CURRENT meter should come to rest at zero.

NOTE

The amplifier has been adjusted at the factory so that the CONTROL CURRENT meter indicates "0" (zero) when ATTENUATOR NO. 1 is in the off position. If the meter does not read zero, let the amplifier warm up for an hour; then, if the meter still does not read zero, adjust it by means of the CONTROL CURRENT meter zero adjustment control, which is accessible with a screwdriver through the front panel hole under the CONTROL CURRENT meter.

(2) Slowly rotate ATTENUATOR NO. 1 clockwise to obtain a setting which gives a 0.7 ma reading on CONTROL CURRENT meter.

(3) Adjust the automatic volume control bias adjustment control, accessible with a screwdriver through the front panel hole under the OUTPUT LEVEL meter, so that the OUTPUT LEVEL meter indicates 0 (zero) db. Should this adjustment change the 0.7 ma reading of the CONTROL CURRENT meter, return the attenuator to zero and repeat the above procedure (steps "p(2)" and "p(3)").

q. Return the signal generator output control to 0 (zero). TUNING METER on receiver should indicate the same as in step "k" (5 ma).

r. Vary the signal-generator output microvolts. The TUNING-METER readings should conform to those listed in Table 4-48.

TABLE 4-48

TUNING-METER READINGS, RADIO RECEIVER BC-639

Receiver Input (microvolts)	Approximate Meter Readings (milliamperes)
10	5.0
100	4.8
1000	3.2
10000	2.0
100000	1.2

s. Disconnect signal generator from receiver-antenna receptacle.

t. Connect receiver-antenna cable to receiver-antenna receptacle.

u. Set Frequency Meter BC-638-A (located at top of rack No. 31) for receiver-calibration accuracy check as follows:

(1) Turn the CRYSTAL SELECTOR switch to the position corresponding to the number of the crystal which will give the desired output frequency (crystal frequency = output frequency ÷ 18).

(2) Turn MIN-MED-MAX switch to MAX.

(3) Set STANDBY-OPERATE switch to OPERATE.

(4) Make certain the 12.5-in. vertical antenna is firmly seated in its socket and not shorted to the panel.

(5) Turn ON-OFF switch to ON. Allow five minutes for the frequency meter to warm up and stabilize.

(6) Turn the knob directly below the calibrated dial to the desired output frequency (18 times the crystal frequency). The exact output frequency is indicated by the smallest angle made by the dark green portion of the indicator tube behind the circular screen near the lower left-hand corner of the panel.

v. Tune the receiver to the frequency-meter signal indicated by maximum deflection of the TUNING METER. If the signal strength at the receiver deflects the meter more than 3 ma, decrease the output of the frequency meter with the MIN-MED-MAX switch. Record the receiver dial setting.

w. Repeat steps "u" and "v" for each crystal in the frequency meter. Receiver dial settings for the recorded frequencies should conform with the respective output frequencies of the frequency meter.

x. Turn STANDBY-OPERATE switch on frequency meter to STANDBY.

y. (Deleted)

NOTE

A receiver, its corresponding rectifier and line amplifier are normally assigned the same identifying number, with channel frequencies set at the remote sites to conform with the local communications plans.

4-62. RADIO RECEIVER R-361/GR. (Fig. 4-92 through 4-94.) Test Radio Receiver R-361/GR as follows (Fig. 4-92):

a. Make certain that circuit breakers No. 1 (rack No. 1), and No. 2 (rack No. 2) in the primary power distribution panel G are in the OFF position.

b. Turn off all power switches on equipment in racks No. 1 and No. 2.

c. Insert a crystal for the desired operating frequency into receiver No. 1 (rack No. 1) as follows:

NOTE

The frequency of the crystal to be used is determined by subtracting 40.4 (mc) from the operating frequency (mc) and dividing the difference by 9. For example, if the receiver is to operate at 265.4 mc, the crystal frequency is determined as follows: (265.4 - 40.4) ÷ 9 = 25 mc. Conversely, multiplying the crystal frequency (mc) by 9 and adding 40.4 gives the operating frequency (mc).

(1) Disconnect antenna cable, power cable, and wires on terminal strip at rear of receiver, and tag the wires for proper reconnection.

(2) Remove dust cover secured by four fasteners that may be released by pressing in and rotating 1/4 turn counterclockwise.

(3) Locate and withdraw crystal oven A501 from the oscillator section (Fig. 4-93).

(4) Remove the three screws at bottom of oven (Fig. 4-94).

(5) Hold base of oven with one hand, and pull off cover with the other hand.

(6) Grasp black bakelite base of heating element and thermostat assembly, and pull straight out. Crystal mounting holes are now exposed, and a crystal in its holder may be mounted therein.

(2) Reduce signal-generator output to 3 microvolts.

(3) Set A.F. GAIN to extreme counterclockwise position.

(4) Turn SQUELCH switch to OFF.

(5) Set AUDIO QUIETING DB control to extreme counterclockwise position.

(6) Disconnect headset from AUDIO OUTPUT jack.

(7) Remove plastic sleeve from Plug PJ-055-B and connect the 680-ohm resistor across the terminals of plug (Table 4-47).

(8) Set multimeter to read 3 volts ac, and connect multimeter across the resistor.

(9) Insert plug, with multimeter and resistor connected, into AUDIO OUTPUT jack.

(10) Slowly and carefully adjust the A.F. GAIN control for a multimeter reading (receiver output) of 2.61 volts ac.

(11) Turn off signal-generator modulation. Multimeter reading should not be greater than 0.825 volt ac. (See note in par. 4-58.)

NOTE

In some signal generators the carrier frequency shifts slightly when modulation is applied, which necessitates retuning the signal generator each time modulation is turned on or off.

p. Turn on signal-generator modulation and set the output to 5 microvolts.

q. Turn SQUELCH switch to ON.

r. Readjust AUDIO QUIETING DB control to position recorded in step "n(2)."

s. Reconnect the two wires to MUTING terminals removed in step "l."

t. Disconnect resistor from Plug PJ-055-B (step "o(7)"), but leave multimeter connected to plug.

u. Readjust A.F. GAIN control for multimeter reading of 1.89 volts ac (zero-dbm sound level). Do not again change this audio adjustment as this is the level at which the line is fed.

v. Disconnect multimeter from AUDIO OUTPUT jack.

w. At AF Amplifier AM-864/U associated with the above receiver, repeat the steps described in Paragraphs 4-61.o. through 4-61.p.(3).

x. (Deleted)

(1) thru (3) (Deleted)

y. Turn the receiver POWER switch to the OFF position.

z. Disconnect the signal generator from the ANT. INPUT receptacle.

aa. Disconnect the power cable and wires from terminal strip at rear of receiver chassis.

ab. Replace the dust cover and secure with the four fasteners.

ac. Reconnect the power cable, wires to the terminal strip, and antenna cable.

ad. Repeat step "a" through "ac" above for each Radio Receiver R-361/GR.

NOTE

A receiver and its corresponding AM-864/U amplifier are assigned the same identifying number, such as "No. 1."

4-63. RADIO RECEIVER R-278B/GR. (Fig. 4-95.) Test Radio Receiver R-278B/GR No. 5 (rack No. 2) as follows:

a. Make certain that circuit breaker No. 3 (rack No. 2) in primary power distribution panel G is in the ON position.

b. Adjust the r-f signal generator (Table 4-47) to provide a signal, modulated 30 percent with 1,000 cps, on the desired operating frequency.

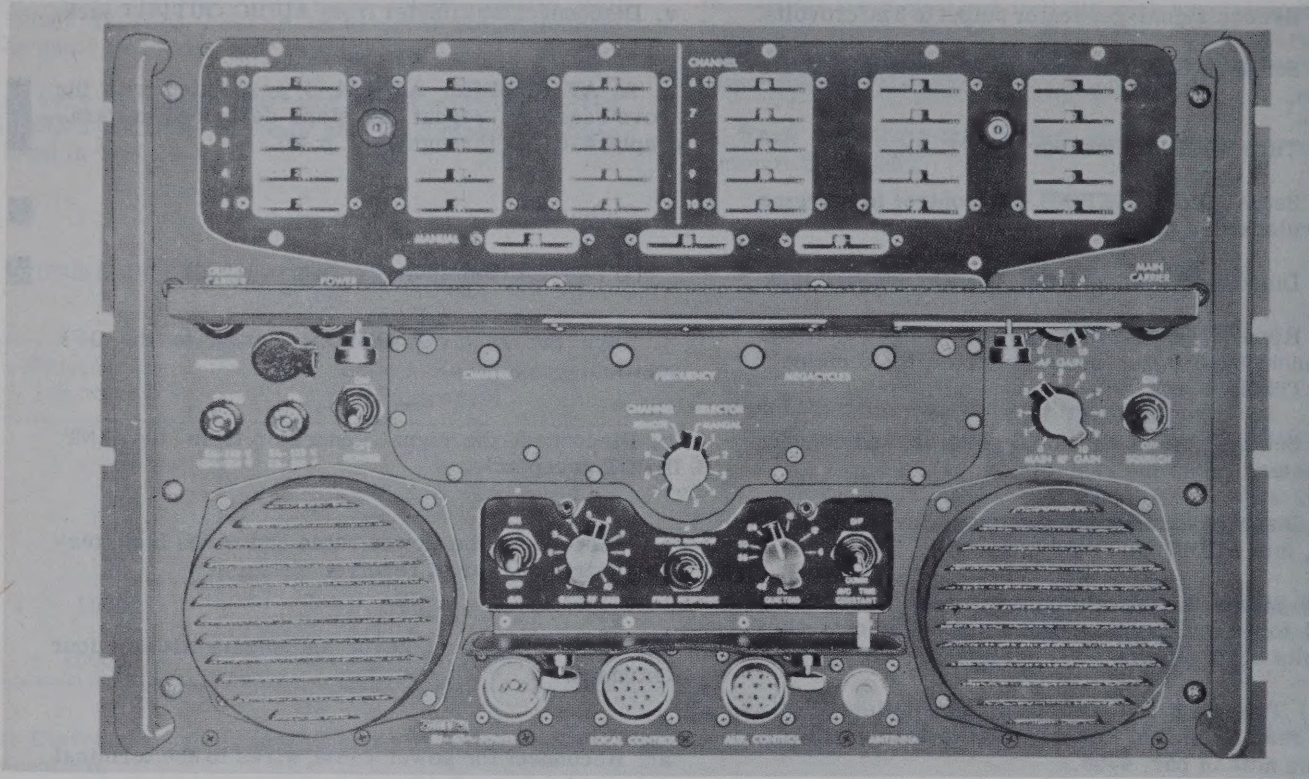


Figure 4-95. Radio Receiver R-278B/GR

c. Turn the signal-generator output to zero microvolts.

d. Set the signal-generator POWER-ON-OFF switch to ON and allow five minutes to warm up.

e. Remove antenna-cable plug and connect output receptacle of signal generator to ANTENNA receptacle of the receiver, using appropriate r-f cable.

f. Withdraw the line plug from PHONES jack on receiver front panel and connect Headset HS-33 (Table 4-47) to the jack.

g. Open the door covering the frequency-selector knurled-disc switches.

h. Open the door below the CHANNEL SELECTOR switch.

i. Set the receiver controls to positions as follows:

(1) AVC switch to LOCAL. (If receiver is R-278/-GR or R-278A/GR with AVC-ON-OFF switch, set to ON.)

NOTE

If the receiver is R-278/GR or R-278A/GR, which incorporates a guard channel receiver, make certain the GUARD RF GAIN control is turned completely counterclockwise to minimize the possibility of interference with the multichannel receiver.

(2) FREQ RESPONSE switch to NARROW.

(3) QUIETING control fully clockwise.

(4) AVC TIME CONSTANT switch to COMM. Make certain the mechanical interlock on door is in corresponding position.

(5) SQUELCH switch to OFF.

(6) RF GAIN control fully clockwise.

(7) CHANNEL SELECTOR switch to MANUAL.

(8) POWER switch to ON. Allow five minutes for receiver to warm up.

(9) Set MANUAL frequency-selector knurled-disc switches on receiver front panel to desired operating frequency. Observe the operation of CHANNEL FREQUENCY MEGACYCLES indicator dials, located directly below the disc-switch cover, to determine that they track properly and indicate the channel and frequency selected.

NOTE

If the receiver is R-278/GR or R-278A/GR, the frequency selected should not be within ±5 mc of the guard-channel-receiver frequency (238 mc to 248 mc).

(10) Set the AF GAIN control to a position where receiver noise is clearly audible in the headphones.

j. Set the signal-generator output, modulated 30 percent with 1,000 cps, to 6 microvolts.

k. Tune the signal generator exactly to the frequency of the receiver, indicated by maximum signal heard in the headphones.

l. Check the carrier-operated relay sensitivity and squelch operation in the following manner:

(1) Set SQUELCH switch to ON.

(2) Turn signal-generator output to 0 (zero).

(3) Set QUIETING CONTROL fully counterclockwise.

(4) Rotate RF GAIN control slowly counterclockwise until carrier-operated relay deenergizes, indicated by a sudden decrease in receiver noise.

(5) Turn QUIETING control to a position where noise is just barely perceptible.

(6) Rotate RF GAIN control slowly clockwise. Carrier-operated relay should actuate near the maximum position, indicated by a sudden increase of noise in the headphones.

(7) Set RF GAIN completely counterclockwise.

(8) Slowly increase the signal-generator output until the relay again actuates. This should occur when generator output is between 100 to 500 microvolts.

m. Check the receiver for a signal-to-noise ratio of 10-to-1 or greater, with 10 milliwatts output, as follows:

(1) Set AF GAIN control to extreme counterclockwise position.

(2) Set RF GAIN fully clockwise.

(3) Set SQUELCH switch to OFF.

(4) Disconnect headset from PHONES jack.

(5) Make certain that other controls are set as in steps "i(1)," "i(2)," "i(4)," "i(7)," and "i(8)."

(6) Remove plastic sleeve from Plug PJ-055-B, and connect the 680-ohm resistor across terminals of the plug (Table 4-47).

(7) Set multimeter (Table 4-47) function switch to read a-c volts and, with appropriate test leads plugged into the 3-volts a-c range, connect the meter across the resistor.

(8) Insert plug, with multimeter and resistor connected, into the PHONES jack.

(9) Set signal-generator output to 6 microvolts (modulated 30 percent with 1,000 cps).

(10) Slowly and carefully advance the receiver AF GAIN control to obtain a multimeter reading (receiver output) of 2.61 volts ac (10 mw "signal").

(11) Retune signal generator exactly to the frequency of the receiver as indicated by maximum multimeter reading. (Readjust the AF GAIN control, if necessary, to maintain the reading of 2.61 volts obtained in step "m(10).")

(12) Turn off signal-generator modulation.

NOTE

In some signal generators the carrier frequency shifts slightly when modulation is applied, which necessitates retuning each time modulation is turned on or off.

(13) Adjust RF GAIN control for multimeter reading of 0.825 volt ac (1 mw "noise").

(14) Turn signal-generator modulation on.

(15) Readjust AF GAIN control to again obtain multimeter reading of 2.61 volts ac.

(16) Turn off signal-generator modulation. Multimeter reading should not be greater than 0.825 volt ac. (See note in par. 4-58.)

NOTE

Within ±5 mc of the guard-channel-receiver frequency (if receiver is R-278/GR or R-278A/GR), it may be necessary to increase signal-generator output. At these frequencies the 10-to-1 signal-to-noise ratio should be obtainable with a signal of not more than 12 microvolts.

n. Set up the other frequencies to be used by the Control-Tower Facility, using the knurled CHANNEL disc switches on receiver front panel. Record the selected frequencies on the chart mounted on disc switch cover.

o. Rotate the CHANNEL SELECTOR switch to each channel in turn, allowing 5 seconds for autoposition mechanism to select the channel. Observe indicator dials as in step "i(9)," and repeat "m" for each frequency. Leave the signal generator and receiver tuned to the last frequency checked but with generator output turned to zero and receiver RF GAIN to maximum.

p. Disconnect multimeter, resistor, and plug from PHONES jack and reconnect headset to the jack.

q. Connect multimeter, minus resistor and plug, to AVC VOLTS jack and ground, and adjust signal-generator output and multimeter to give an avc reading of 4 or 5 volts dc.

NOTE

The avc voltage jack (J-606) in receivers R-278/GR and R-278A/GR is located on the third i-f chassis inside the receiver. To obtain above reading (step "q"), the dust cover must be removed and the interlock switch operated manually.

r. Reposition the receiver several times, and record the signal-generator output voltage required to bring the avc voltage back to the original reading obtained in step "q." The input voltage (generator output) ratio should not be greater than 2:1 when recycling to the same channel.

s. Turn SQUELCH switch to ON and generator output to zero.

t. With RF GAIN turned to maximum clockwise position, listen to headphones, and adjust AF GAIN to a setting where receiver noise is plainly audible.

u. Slowly rotate RF GAIN control counterclockwise until carrier-operated relay deenergizes (noise suddenly decreases). Leave the control in this position.

v. Turn signal-generator modulation on and slowly increase generator output until carrier-operated relay again energizes (signal is suddenly heard).

w. Disconnect headset from PHONES jack and replace line plug withdrawn in step "f."

x. Disconnect multimeter from receiver, and set its function switch to read a-c volts.

y. Open front of Distribution Panel J-390/GR, located above Desk Shelf MX-1058/U in same rack as receiver, and connect multimeter across terminals No. 19 and No. 20 (receiver output line). Do not disconnect the line wires that are connected to these terminals.

z. Adjust AF GAIN control for multimeter reading of 1.89 volts ac (zero-db sound level). Do not change this audio adjustment again, as this is the level at which the line is fed.

aa. Disconnect the multimeter from Distribution Panel J-390/GR, and close the cover.

ab. At the AM-864/U amplifier associated with the above receiver, repeat the steps described in Paragraphs 4-61.o. through 4-61.p.(3).

ac. (Deleted)

(1) thru (3) (Deleted)

ad. Disconnect the signal generator from ANTENNA receptacle and reconnect antenna cable plug removed in step "e."

ae. Set CHANNEL SELECTOR switch to the REMOTE position.

NOTE

A receiver and its corresponding AM-864/U amplifier are normally assigned the same identifying number, with channel frequencies set to conform with local communication plans at the remote sites.

4-64. TRANSMITTER SITE.

4-65. Test the transmitters for proper performance according to the following instructions. Follow the order of steps given herein. Tools and test equipment required are listed in Table 4-49.

TABLE 4-49

EQUIPMENT AND MATERIALS REQUIRED FOR TESTS AT TRANSMITTER SITE

Description	Qty	Source
Tools	1	See par. 4-5
Multimeter TS-352A/U or equivalent	1	See par. 4-5
Cord CD-307	1	See Table 4-9
Headset HS-33	1	See Table 4-9
Microphone T-17	1	See Table 4-9

bo. Turn TUNE-OPERATE switch to OPERATE. Meter should read between 50 and 70 ma.

bp. Return METER RANGE selector switch to PA-G.

bq. Retune AMP. GRID dial on amplifier panel for maximum meter reading. Meter (G1) should read between 8 and 18 ma.

br. Turn grid-current selector switch to G2. Meter reading should be similar to that obtained in step "bq."

bs. Minimize antenna coupling by turning COUPLING dial on amplifier panel in direction of lower reading.

bt. Tune AMP. PLATE dial on amplifier panel slowly and carefully to resonance, which is indicated by minimum meter reading (see step "av").

bu. Rotate AMP. PLATE dial back and forth through resonance while tuning the NEUT. dial on amplifier panel to a setting where dip in meter reading is minimized or no dip occurs. This indicates correct neutralization (see step "aw").

bv. Return TUNE-OPERATE switch to TUNE.

bw. Repeat steps "ay" through "bb."

bx. Replace amplifier neutralizing link removed in step "i." Then close cabinet door.

by. Turn the transmitter on (steps "v" through "y").

bz. Turn METER RANGE selector switch to PA-C.

ca. Turn cathode-current selector switch on lower left side of Amplifier Panel PN-8-C to C1.

cb. Tune AMP. PLATE dial for minimum reading on meter (plate circuit resonance), and record the dial setting and meter reading (C1). (Retain a record of meter readings obtained in steps "cb," "cc," "cd," and "ce," for use in step "cf.")

cc. Turn amplifier cathode-current selector switch to C2, and record the meter reading.

cd. Return METER RANGE selector switch to PA-G, and record the meter reading (G2).

ce. Return grid-current selector switch to G1, and record the meter reading.

cf. Compare meter readings. If "cb" is within 3 ma of "cc," and "cd" within 3 ma of "ce," proceed with step "cg." If readings vary more than 3 ma, vacuum tubes V-201 and V-202 are unbalanced, and one or both should be replaced in the following manner:

(1) Repeat steps "ay" through "bb."

WARNING

Momentarily ground the plate lines to chassis with an insulated-handle screwdriver to assure capacitor discharge. Do not touch vacuum tubes until they have had time to cool.

(2) Replace the vacuum tube that gave the lowest meter reading obtained in step "cb" or "cc." C1 reading is that of vacuum tube V-201; C2 reading is that of V-202 (Fig. 4-97).

(3) Remove amplifier neutralizing link replaced in step "bx." Then close cabinet door.

NOTE

When vacuum tubes are changed, it is frequently necessary to reneutralize the amplifier.

(4) Repeat steps "bk" through "cf" until a pair of matched tubes (see step "cf") is obtained.

cg. With METER RANGE selector switch set to PA-G, slowly rotate AMP. PLATE dial through resonance. Maximum meter reading should occur at approximately the same dial setting as recorded in step "cb"; that is, meter readings for maximum grid current and minimum cathode current should be obtained at approximately the same AMP. PLATE dial setting, thus indicating complete neutralization. If dial reading is correct, proceed with step "ck." If dial reading is not correct, the amplifier should be reneutralized.

ch. Repeat steps "ay" through "bb."

ci. Remove the amplifier-panel neutralizing link that was replaced in step "bx." Then close cabinet door. Observe warning in step "cf."

cj. Repeat steps "v" through "y" and "bp" through "cg."

ck. Return METER RANGE selector switch to PA-C.

cl. Return TUNE-OPERATE switch to OPERATE.

cm. Turn COUPLING dial to a higher setting until meter reading starts to increase.

cn. Tune ANTENNA dial on amplifier panel for maximum meter reading.

co. Vary both COUPLING and ANTENNA dials until meter reads between 50 and 75 ma with a minimum COUPLING dial setting.

cp. Return cathode-current selector switch to C1. Meter reading should be approximately the same as in position C2.

cq. Return METER RANGE selector switch to PA-G.

cr. Pull out crystal from amplifier front panel. Meter reading should drop to zero. If it does not, rotate amplifier NEUT. dial five divisions or less in the direction which reduces the meter reading. If zero reading is reached within this range, proceed to step "cv." If not, amplifier should be reneutralized (steps "cs" through "cu").

cs. Replace the crystal.

ct. Repeat steps "ay" through "bb."

cu. Remove amplifier panel neutralizing link. Then close cabinet door and repeat steps ''v'' through ''y'' and ''bp'' through ''cr.'' Observe warning in step ''cf.''

cv. Carefully retune IPA and AMP. GRID dials for maximum meter reading.

cw. Turn grid-current selector switch to MON. Meter reading should be between 1 and 3 ma.

NOTE

The plate-line shorting bar must be set accurately to permit full tuning range of the transmitter to be covered. When the plate-line shorting bar is correctly adjusted for the 100- to 125-mc band, the AMP. PLATE dial on Amplifier Panel PN-8-C should read between 2 and 5 for 100 mc and between 98 and 100 for 125 mc. When correctly adjusted for the 125- to 156-mc band, the AMP. PLATE dial should read between 0 and 2 for 125 mc and between 95 and 97 for 156 mc.

cx. Check the frequency setting of the AMP. PLATE dial. If it is in accordance with above note, proceed with step ''cy.'' If not, the shorting bar (see step ''m'') should be readjusted and the amplifier retuned and reneutralized as follows:

(1) Repeat steps ''ay'' through ''bb,'' and again remove the amplifier neutralizing link. Observe warning in step ''cf.''

(2) If the amplifier is tuned for use in the 100- to 125-mc bank and an increased dial reading is desired, move the plate-line shorting bar downward (see step ''m'' and Fig. 4-99); if a decreased dial reading is desired, move the bar upward.

(3) If the amplifier is tuned for use in the 125- to 156-mc band and increased dial reading is desired, move the bar away from the vacuum tubes; if a decreased dial reading is desired, move the bar toward the vacuum tubes.

(4) Close cabinet door and repeat steps ''v'' through ''y'' and ''bk'' through ''cx.''

cy. Turn METER RANGE selector switch to MOD.

cz. Turn VOLUME CONTROL on Modulator Panel PN-10-C fully counterclockwise.

da. Connect a T-17 or equivalent microphone into No. 1 MICROPHONE jack on modulator panel.

db. Connect a headset to the MONITOR TEL jack on amplifier panel.

dc. While listening to the headphones, speak at an angle to (not directly into) the microphone, two to six inches from the mouthpiece, with normal conversational volume. Slowly turn the VOLUME CONTROL clockwise until the peak meter reading is 110 ma. The voice heard should be clear, distinct, and free from excessive noise and distortion.

dd. Establish telephone communication with an operator in the receiver building, and have the transmitted signal checked with a calibrated receiver to make certain that the output frequency is correct.

de. Remove the microphone and headset from the transmitter.

df. Return VOLUME CONTROL to the extreme counterclockwise position.

dg. Set LOCAL-REMOTE switch to the REMOTE position to permit operation from the control-tower console.

dh. After the radio transmitter has been tuned for a particular frequency, record the dial settings and frequencies on the blank charts located in the rear-door compartment. (There are separate blanks for the oscillator and amplifier panels.) Now slide each chart into its holder on the front of the proper panel.

di. (Deleted) ■

4-67. RADIO TRANSMITTER T-282/GR AND MODULATOR-POWER SUPPLY MD-141A/GR.

(Fig. 4-106 and 4-107.) Test Radio Transmitter T-282/GR and Modulator-Power Supply MD-141A/GR No. 1 (rack No. 1) as follows (Fig. 4-106):

WARNING

High voltages in this equipment are dangerous to life. When operating the equipment with the dust covers removed, special care must be taken to avoid contact with the circuits carrying these voltages.

a. Set to the OFF position main circuit breaker No. 1 (rack No. 1) on power distribution panel G. This circuit breaker supplies power to the modulator-power supply.

b. Set the switches and controls on Modulator-Power Supply MD-141A/GR as follows:

(1) PLATE ON-OFF switch to the OFF position.

(2) POWER ON-OFF switch to the OFF position.

(3) LIMITER THRESHOLD control to the extreme counterclockwise position.

(4) GAIN control on 0 (zero).

(5) NARROW-BROAD switch on the NARROW position.

ad. Turn the NORMAL-EMER. switch on modulator-power supply to EMER.

ae. Turn the CHANNEL SELECTOR switch on the transmitter to REMOTE.

af. Remove headset connected in step "z(10)."

4-69. AIR-TRAFFIC-CONTROL-TOWER SITE.

4-70. Test the control-tower equipment for proper performance according to the following instructions. The required tools and test equipment are indicated in Table 4-54.

TABLE 4-54

EQUIPMENT AND MATERIALS REQUIRED FOR TESTS AT AIR-TRAFFIC-CONTROL-TOWER SITE

Description	Qty	Source
Tools		See par. 4-5
Multimeter TS-352A/U or equivalent	1	See par. 4-5
Test Meter TS-80/U or equivalent	1	See par. 4-5
Test Equipment IE-19-( )	1	See par. 4-5
Cord CD-307	1	See Tables 4-10 and 4-11
Headset HS-33	1	See Tables 4-10 and 4-11
Microphone T-17	1	See Table 4-9

4-71. AIRPORT CONTROL TOWER CONSOLE AN/-FRC-19B. (Fig. 4-78, 4-79, and 4-110 through 4-116.) Test Airport Control Tower Console AN/FRC-19B as follows:

a. Transmitter Operator:

(1) Make certain that the steps for tuning the transmitters were performed in the order given in Paragraphs 4-64 through 4-68.

(2) Check the circuit breakers on primary power distribution panel G. No. 5 should be in the OFF position, No. 1 through No. 4 and No. 6 through No. 8 should be in the ON position.

(3) Turn on each Modulator-Power Supply MD-141A/GR. (See steps "h(1)," "h(2)," and first sentence of "h(6)," par. 4-67.)

(4) Set POWER switch on Modulator-Power Supply MD-129A/GR to ON.

(5) Turn on Radio Transmitter BC-640. (See steps "v" through "y," par. 4-66.)

(6) (Deleted)

(7) Set the power switch in the center front of each Control Panel PP-1453/FSA-4 to the downward position.

NOTE

Power Supply PP-1453/FSA-4 has no on-off switch. Line voltage is supplied to the unit when the primary power circuit breaker is turned on.

(8) Set circuit breaker No. 5 in power distribution panel G to ON. The neon POWER ON lamp on Power Supply PP-1453/FSA-4 should light.

NOTE

If the neon STANDBY lamp shows brilliancy, depress and release the RECYCLE pushbutton on the power-supply panel.

(9) Turn the power switches (step "a(7)") on the top five (only) SB-270 control panels to ON. The red 24V DC POWER lamps should light.

(10) In turn, depress and release each TRANSMITTER KEY pushbutton on the above five control panels. The associated green IN USE lamp should light, and the carrier of the transmitter that is indicated on the chart beside the transmitter key should go on the air.

(11) Establish telephone communication with the Tower Operator for further tests.

b. Tower Operator:

CAUTION

Do not operate a microphone push-to-talk switch before receiving assurance that the transmitters are ready to be keyed.

(1) Remove front covers from console Field Lighting Control Group OA-228/CRC, Meteorological Indicator Group OA-118/CRC, Communications Group OA-119/CRC, and Control Monitor Group OA-115/-CRC.

(2) Set main console circuit breaker No. 2 on primary power distribution panel H to the ON position.

(3) Turn the GAIN control on each Amplifier AM-365/CRC in the console control monitor group to 0 (zero).

(4) Set each amplifier OUTPUT control to 20 DBM.

(5) Set all POWER switches and circuit breakers in the console to ON.

(6) Set the function switch on the multimeter (Table 4-49) to read a-c volts, and connect test leads to the 3 volts a-c range.

(7) Connect the multimeter to terminals No. 6 and No. 7 (channel No. 1) on terminal strip E1901 of the auxiliary transmitter line terminal unit in the console

communications group (Fig. 4-78). Do not disconnect the wires already connected to these terminals.

NOTE

There are two operating positions on the AN/FRC-19( ) Control-Tower Console. In the following type VHF/UHF channel check discussion, the left hand position or operating station will be referred to as position A, the other as position B.

(8) Set SELECT CHANNEL switch No. 1 on the TRANSMITTER CONTROL panel at position A to READY. Make certain that all other channel selector switches at both A and B positions are set to STANDBY and that the EMERGENCY BREAK IN switches have been released. (Momentarily press the RELEASE pushbutton.)

(9) Establish telephone communication with the Transmitter Operator to determine transmitter conditions before making further tests or adjustments.

(10) Depress the push-to-talk switch on position A microphone. The channel No. 1 green READY lamp, the amber LOCAL lamp at position A, and the channel No. 1 red IN USE lamp at position B should light.

(11) Speak in normal voice volume two to six inches from the microphone and, while observing the multimeter, slowly advance the position A amplifier GAIN control. Determine a dial reading where further clockwise rotation causes no further increase in the multimeter reading.

(12) Advance the GAIN control 4 db higher than the dial reading obtained in step ‘‘b(11).’’

(13) Adjust the OUTPUT control as necessary to obtain a peak multimeter reading of 1.89 a-c volts (zero-dbm level). Then release the microphone push-to-talk switch.

(14) Return the channel No. 1 transmitter-control switch to the STANDBY position. Indicator lamps should go out.

(15) Repeat steps ‘‘b(10)’’ through ‘‘b(13),’’ substituting position B for position A.

(16) Return the A position, channel No. 1, transmitter-control switch to READY.

(17) Momentarily depress then release the EMERGENCY BREAK IN pushbutton at position A.

(18) Depress the push-to-talk switch on position A microphone. The amber LOCAL and REMOTE lamps (at both positions) should blink and position A should have control of the channel. Verify this by operating first the A microphone, then the B microphone, while observing the multimeter. No voice response should be indicated from position B.

(19) With the push-to-talk switches released, momentarily depress then release the EMERGENCY RELEASE pushbutton at position A. Channel control should return to normal. Leave channel selector switches at READY.

(20) Repeat steps ‘‘b(17),’’ ‘‘b(18),’’ and ‘‘b(19),’’ substituting position B for position A in step ‘‘b(19).’’ Leave channel selector switches at STANDBY.

(21) Check each transmitter in turn using the method outlined in step "b(16)" through "b(20)." Connect the multimeter to terminals No. 6 and No. 7 of appropriate terminal strip (Fig. 4-78 and 4-79) in accordance with step "b(7)" and Table 4-55. When each SELECT CHANNEL switch is placed in the "Ready" position and the microphone push-to-talk switch is depressed, the associated transmitter should operate.

TABLE 4-55

MULTIMETER CONNECTIONS, TRANSMITTER CHANNEL TEST

Channel No.	Terminal Strip No.	Location
1	E1901	OA-119/CRC (Fig. 4-77)
2	E1902	OA-119/CRC (Fig. 4-77)
3	E1903	OA-119/CRC (Fig. 4-77)
4	E1904	OA-119/CRC (Fig. 4-77)
5	E551	OA-115/CRC (Fig. 4-78)
6	E552	OA-115/CRC (Fig. 4-78)
7	E553	OA-115/CRC (Fig. 4-78)
8	E554	OA-115/CRC (Fig. 4-78)
9	E555	OA-115/CRC (Fig. 4-78)
10	E556	OA-115/CRC (Fig. 4-78)
11	E557	OA-115/CRC (Fig. 4-78)
12	E558	OA-115/CRC (Fig. 4-78)

(22) Disconnect the multimeter from terminals No. 6 and No. 7.

(23) Set SELECT CHANNEL switch No. 1 on the TRANSMITTER CONTROL panel at console position

A to READY, depress the A position push-to-talk switch, and speak in normal voice volume two to six inches from the microphone, as in step "b(11)."

c. Transmitter Operator:

(1) Connect a headset to the SIDE TONE OUTPUT jack on channel No. 1 Radio Transmitter T-282/GR (transmitter No. 1, rack No. 1).

(2) While the Tower Operator is keying the transmitter and speaking (step "b(23)"), slowly advance the modulator GAIN control until METER 2 indicates a peak reading of 95-percent modulation.

(3) Listen to the headphones, and slowly advance the LIMITER THRESHOLD control until the peak meter reading is limited to 85-percent modulation. The voice heard should be clear, distinct, and free from excessive noise and distortion. Channel No. 1 transmitter is now ready for use in regular communication.

d. Tower and Transmitter Operator: Release the push-to-talk switch, and return SELECT CHANNEL switch No. 1 to STANDBY. In turn, repeat steps "b(23)" through "c(3)," substituting SELECT CHANNEL switch No. 2, 3, or 4 for switch No. 1.

e. Tower Operator: Repeat step "b(23)," substituting SELECT CHANNEL switch No. 5 for SELECT CHANNEL switch No. 1.

f. Transmitter Operator:

(1) Connect a headset to the MONITOR TEL jack on Amplifier Panel PN-8-C of Radio Transmitter BC-640-D No. 31 (rack No. 31).

(2) Make sure the METER RANGE selector switch is set to MOD. Then, while the Tower Operator is keying the transmitter and speaking (step "b(23)"), listen to the headphones and slowly rotate the VOLUME CONTROL on Modulator Panel PN-10-C in a clockwise direction until the peak reading on the transmitter meter is 110 ma. The voice heard should be clear, distinct, and free from excessive noise and distortion.

g. and h. (Deleted)

(1) thru (4) (Deleted)

i. (Deleted)

j. Tower Operator:

(1) (Deleted)

NOTE

Radio Transmitter T-217A/GR is not normally connected to the console. To control the transmitter from the console, a patch-cord connection must be made in the air-traffic-control-tower equipment room.

(2) At Interconnecting Group OA-447/FSA-4 (Fig. 4-110) in the control-tower equipment room, select a short patch cord (3E3P7D).

(3) Connect one end of the patch cord to TRANSMITTER LINES jack No. 5 on Telephone Jack Assembly TA-238/FSA-4 (Fig. 4-61) in the upper jack group.

(4) Connect the other end of the patch cord to TRANSMITTER CONTROL SWITCHES jack No. 1 on Telephone Jack Assembly TA-238/FSA-4 (Fig. 4-61) in the upper jack group. SELECT CHANNEL switch No. 1 on the transmitter control panel at either console position now controls Radio Transmitter T-217A/GR No. 5.

(5) Repeat step "b(23)." If transmitter is model T-217/GR, do not exceed the duty cycle (step "n," par. 4-68).

k. Transmitter Operator:

(1) Connect a headset to the MONITOR jack on Radio Transmitter T-217A/GR No. 5, rack No. 3.

(2) While the Tower Operator is keying the transmitter and speaking, slowly advance the AUDIO GAIN control until a peak meter reading of 95-percent modulation is obtained.

(3) Rotate the LIMITER CONTROL clockwise until above reading (step "k(2)") is reduced to 85 percent. Listen to the headphones. The voice heard should be clear, distinct, and free from excessive noise and distortion.

(4) Return AUDIO GAIN control to extreme counterclockwise position.

(5) Return LIMITER CONTROL to extreme counterclockwise position.

l. Tower Operator:

(1) thru (6) (Deleted)

(7) Rotate the TRANSMITTER CHANNEL SELECTOR switch on the panel of Control Indicator C-806/GR to each channel in turn, and check with the Transmitter Operator to verify that the dial indications on the panel coincide with the channels selected.

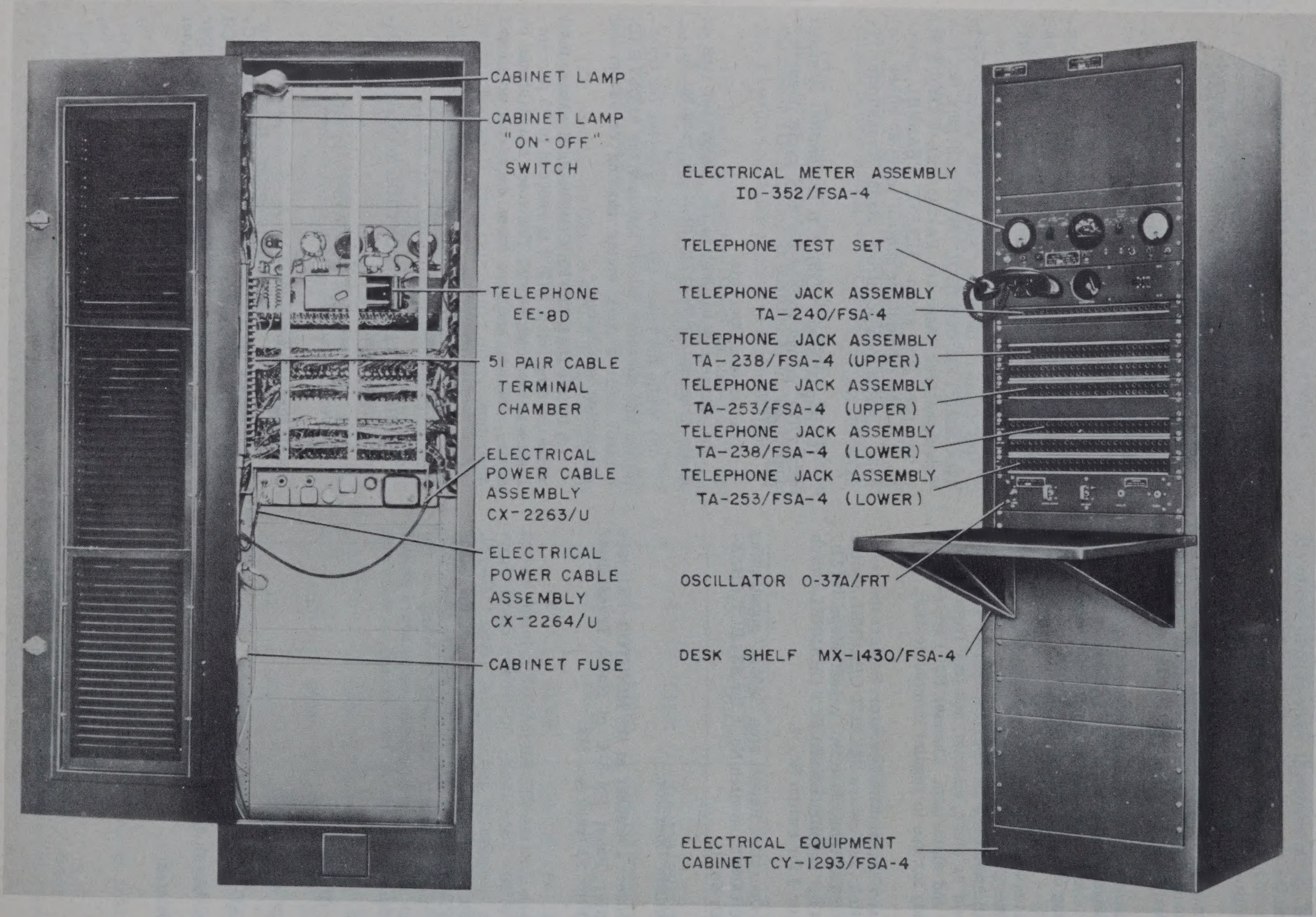

CABINET LAMP
CABINET LAMP "ON-OFF" SWITCH
TELEPHONE EE-8D
51 PAIR CABLE TERMINAL CHAMBER
ELECTRICAL POWER CABLE ASSEMBLY CX-2263/U
ELECTRICAL POWER CABLE ASSEMBLY CX-2264/U
CABINET FUSE
ELECTRICAL METER ASSEMBLY ID-352/FSA-4
TELEPHONE TEST SET
TELEPHONE JACK ASSEMBLY TA-240/FSA-4
TELEPHONE JACK ASSEMBLY TA-238/FSA-4 (UPPER)
TELEPHONE JACK ASSEMBLY TA-253/FSA-4 (UPPER)
TELEPHONE JACK ASSEMBLY TA-238/FSA-4 (LOWER)
TELEPHONE JACK ASSEMBLY TA-253/FSA-4 (LOWER)
OSCILLATOR O-37A/FRT
DESK SHELF MX-1430/FSA-4
ELECTRICAL EQUIPMENT CABINET CY-1293/FSA-4

Figure 4-110. Interconnecting Group OA-447/FSA-4

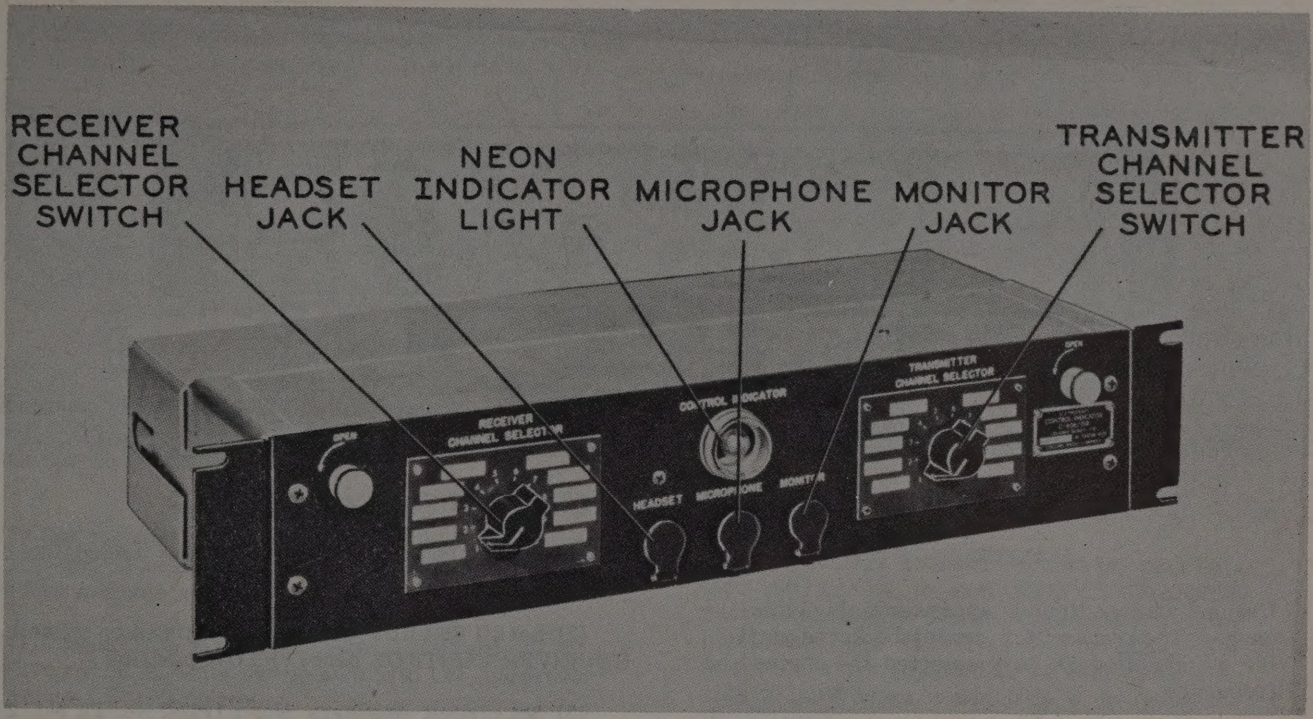

RECEIVER CHANNEL SELECTOR SWITCH
HEADSET JACK
NEON INDICATOR LIGHT
MICROPHONE JACK
MONITOR JACK
TRANSMITTER CHANNEL SELECTOR SWITCH
RECEIVER CHANNEL SELECTOR
CONTROL INDICATOR
TRANSMITTER CHANNEL SELECTOR
OPEN
HEADSET
MICROPHONE
MONITOR

Figure 4-111. Control Indicator C-806/GR

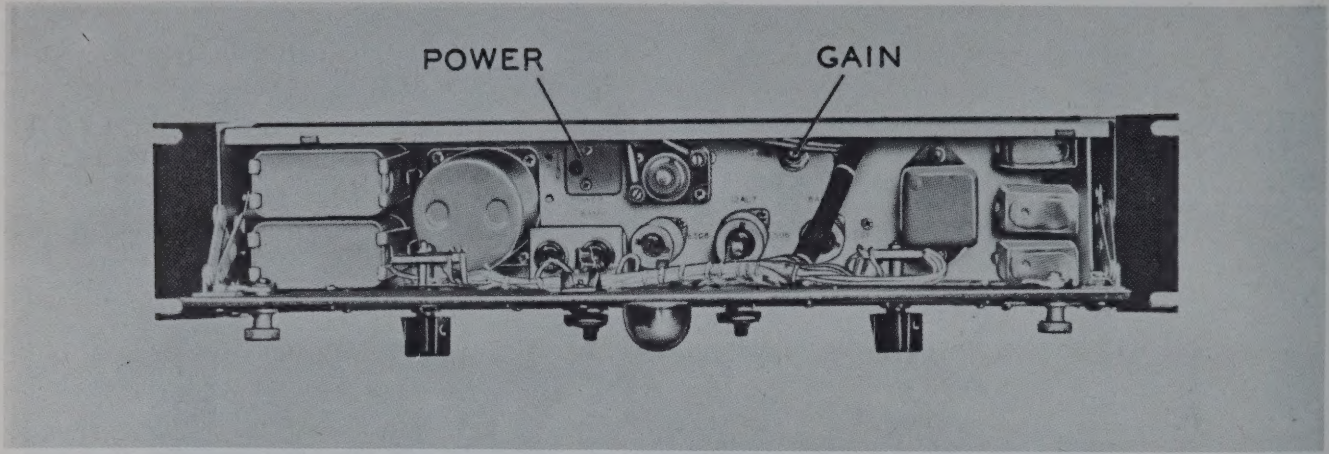


Figure 4-112. Control Indicator C-806/GR, Front Panel Open

NOTE

Channel change time is approximately 7 seconds. The transmitter cannot be keyed until the autopositioners have selected the desired frequency.

(8) Turn the TRANSMITTER CHANNEL SELECTOR switch to the desired operating channel.

m. Transmitter Operator:

(1) At Interconnecting Group OA-447/FSA-4 (Fig. 4-110) in the transmitter room, select a short patch cord (3E3P7D).

(2) Connect one end of the patch cord to CONT. TWR. LINES jack No. 5 on Telephone Jack Assembly TA-238/FSA-4 in the upper jack group (Fig. 4-43).

(3) Connect the other end of the patch cord to TRANSMITTER INPUTS jack No. 5 on Telephone Jack Assembly TA-253/FSA-4 in the upper jack group.

n. Tower Operator: Depress the push-to-talk switch and speak at an angle to (not directly into) the microphone. (If the transmitter is T-217/GR, do not exceed the duty cycle—step "n," par. 4-68.)

o. Transmitter Operator: Repeat steps "k(2)" and "k(3)." Then remove headset from transmitter.

p. Tower Operator: When step "o" is completed, while speaking, adjust the GAIN on Control Indicator C-806/GR (screwdriver adjustment on chassis, Fig. 4-112) until the neon lamp on front panel glows when the transmitter is being modulated. Listed to monitor output in headphones. Voice heard should be clear, distinct, and free from excessive noise and distortion.

q. Transmitter Operator: Remove the patch cord connected in steps "m(2)" and "m(3)." This completes the tests in the transmitter building.

r. Tower Operator:

(1) Remove microphone and headset connected in steps "l(4)" and "l(5)," and close the hinged front cover of the control indicator.

(2) Set all SELECT CHANNEL switches on console RECEIVER CONTROL panel to LOW position.

(3) Set circuit breakers No. 1 (rack No. 1), No. 2 (rack No. 2), No. 3 (rack No.3), No. 4 (rack No. 4), and No. 5 (rack No. 5) on primary power distribution panel in equipment room to ON.

NOTE

Racks No. 2, No. 3, No. 4, and No. 5 contain a power switch and fuse box inside the bottom left of cabinet. Make certain the switch is in the ON position.

(4) Turn the POWER switches on all AF Amplifiers AM-447A/G (equipment-room rack No. 2) to ON.

NOTE

The backup receivers are not normally connected to the console. Patch cords must be set up to complete the circuits to the RECEIVER CONTROL SELECT CHANNEL switches on the console.

(5) At Interconnecting Group OA-447/FSA-4 (Fig. 4-110) in the control-tower equipment room select a short patch cord (3E3P7D).

(6) Connect one end of the patch cord to jack No. 5 in the AMPLIFIER AM-447A/G OUTPUTS group (Fig. 4-61) on Telephone Jack Assembly TA-253/FSA-4 (Fig. 4-110) in the lower jack group.

(7) Connect the other end of the patch cord to jack No. 7 in the RECEIVER CONTROL SWITCHES group (Fig. 4-61) on Telephone Jack Assembly TA-253/FSA-4 (Fig. 4-110) in the lower jack group.

(8) In like manner, connect another patch cord to jack No. 33 in the amplifier outputs group and to jack No. 8 in the receiver control switches group.

s. Receiver Operator:

(1) Make certain that the steps for tuning receivers were performed in the order given in Paragraphs 4-59 through 4-63 and that circuit breakers No. 1 (rack No. 1), No. 2 (rack No. 2), No. 3 (rack No. 3), and No. 6 (rack No. 31) on primary power distribution panel G in the receiver building equipment room are in the OFF position.

(2) Set circuit breaker No. 5 (rack No. 51) on primary power distribution panel G to the ON position.

NOTE

Rack No. 51 contains a power switch and fuse box inside the bottom left of cabinet. Be sure the switch is in the ON position.

(3) Set the line power switches on front panels of the AM-864/U amplifier in rack No. 51 to ON, and allow five minutes warm-up time.

(4) Connect the a-f signal generator (Table 4-47) to an a-c outlet, turn its power switch to ON, and allow five minutes warm-up time.

(5) Set the signal generator output control to maximum attenuation (no signal output) and the frequency control to 1,000 cps.

(6) Connect output of the signal generator to the INPUT terminals on rear terminal strip of AF Amplifier BC-730-C No. 1. Do not remove wires already connected to these terminals.

(7) Adjust the signal-generator output control to obtain a reading of 0 (zero) on the amplifier OUTPUT LEVEL meter. Do not make adjustments with amplifier controls as these controls have been set for their respective receiver outputs.

t. Tower Operator:

NOTE

The signal (step ‘‘s(7)’’) should now be heard from the channel No. 1 loudspeaker on the console, and the associated indicator lamp adjacent to the loudspeaker should be illuminated. This lamp should glow when a signal is being received, regardless of the position of the SELECT CHANNEL switch.

(1) Set SELECT CHANNEL switch No. 1 on the console RECEIVER CONTROL panel to the HIGH position. The green HIGH indicator lamp should light and the signal should be heard from the loudspeaker at full volume.

NOTE

Full volume is adjusted at the factory. If not satisfactory, readjustment can be made with the VOLUME SPEAKER control on the front panel of the associated AM-447A/G amplifier in the equipment room.

(2) Set SELECT CHANNEL switch No. 1 to the OFF position. The red OFF indicator lamp should glow and no output should be heard from the loudspeaker.

(3) Return SELECT CHANNEL switch to LOW.

NOTE

The attenuators mounted behind the plug buttons adjacent to each SELECT CHANNEL switch are used to set the loudspeaker volume level when the switch is set to LOW. The attenuators are adjusted at the factory to provide a LOW volume which is 6 db below the HIGH level.

u. Tower and Receiver Operator: Repeat steps "s(5)" through "s(7)" successively, substituting Amplifier AM-864/U No. 2, No. 3, No. 4, No. 5, and No. 31 for No. 1. Repeat steps "t(1)" through "t(3)" substituting SELECT CHANNELS switch associated with the above circuits for No. 1.

v. Tower Operator:

(1) Remove the patch cord plug, connected in step ‘‘r(8),’’ from jack No. 8 (only), and connect it to jack No. 9. Signal should be heard from channel No. 9 loudspeaker on the console, and the associated indicator lamp adjacent to the loudspeaker should be illuminated.

(2) Repeat steps ‘‘t(1)’’ through ‘‘t(3),’’ substituting SELECT CHANNEL switch No. 9 for switch No. 1.

(3) Check the remaining speaker channels in a similar manner by repeating steps ‘‘v(1)’’ and ‘‘t(1)’’ through ‘‘t(3),’’ successively substituting jack No. 10, No. 11, and No. 12 for No. 9 and substituting SELECT CHANNEL switch No. 10, No. 11, and No. 12 for No. 9.

(4) When above tests have been completed, disconnect both ends of the patch cords used in steps ‘‘r(6),’’ ‘‘r(7),’’ ‘‘v(1),’’ and ‘‘v(3).’’

(5) thru (9) (Deleted)

All data deleted from page 194.
Figure 4-113. (Deleted)

Pages 195 and 196, figures 4-114, 4-115, and 4-116 deleted.

(50) thru (60) (Deleted)

w. (Deleted)

(1) thru (7) (Deleted)

x. Tower Operator:

(1) Rotate RECEIVER CHANNEL SELECTOR switch on Control Indicator C-806/GR to each channel position in turn, allowing 5 seconds for each change. Determine from the Receiver Operator whether the CHANNEL FREQUENCY—MEGACYCLES indicator dials on Radio Receiver R-278B/GR track properly, that is, whether they indicate the channel and frequency selected.

(2) Transmitter equipment, receiver equipment, and control-tower equipment should now be in ready condition for normal two-way radio communication.

4-72. RADIO SET AN/GRC-32B (MODIFIED). (Fig. 4-51.) Adjust and test Radio Set AN/GRC-32B (modified for use in the air traffic control tower) according to the procedures given below.

4-73. Radio Set AN/GRC-32B has provision for presetting 18 main-channel frequencies and one guard-channel frequency. These are preset on Radio Set Control C-626/ARC-27 (Fig. 4-51) and may be selected by the operation of either the LOCAL CHANNEL SELECTOR switch on Radio Set Control C-626/ARC-27 or the CHANNEL switch on Radio Set Control C-628/-ARC-27 (Fig. 4-51). Follow steps "a" through "m" below for presetting the desired frequencies. All components referred to are shown in Figure 4-51.

a. Check the INPUT VOLTAGE RANGE and INPUT VOLTAGE ADJUSTMENT switches on Power Supply PP-894/GRC-32B. These should be set to approximately 115 volts.

b. Throw the POWER ON-OFF switch on the power supply to the POWER ON position.

c. Set the ON-OFF switch on Radio Set Control C-626/ARC-27 to the ON position, and allow five minutes for equipment to warm up.

NOTE

The ON-OFF switch on Radio Set Control C-626/ARC-27 should be left in the ON position. Power is then controlled from the POWER ON-OFF switch on the power supply. When the LOCAL-REMOTE switch is set to REMOTE the ON-OFF switch will not interfere with operation of the set from Radio Set Control C-628/ARC-27 even if it is set to the OFF position. In extremely cold weather, this power switch should be used to allow the power supply to warm up for a minute before connecting the load, when the LOCAL-REMOTE switch is set to "LOCAL."

d. Set the LOCAL-REMOTE switch on Radio Set Control C-626/ARC-27 to the LOCAL position.

e. Set the GUARD-BOTH-COMD T/R switch on Radio Set Control C-626/ARC-27 to the COMD T/R position.

f. Rotate the LOCAL CHANNEL SELECTOR switch to position 1.

g. Loosen the wingnuts on the three frequency selectors by counterclockwise rotation until they turn freely.

h. Rotate the three knobs until the numerals in the MEGACYCLES windows indicate the desired frequency of channel 1.

i. Tighten the three wingnuts by clockwise rotation. Hold the knobs so that they do not move during tightening.

j. Turn the LOCAL CHANNEL SELECTOR switch to another channel and return it again to channel 1. Check to see that the frequency is still correct.

k. Repeat steps "f" through "j" for each of the channels to be preset.

l. Set the GUARD-BOTH-COMD T/R switch to the GUARD position.

m. Follow the procedure outlined in steps "f" through "j," choosing the desired frequency in the guard band. Check by turning the GUARD-BOTH-COMD T/R switch to BOTH, then back to GUARD. The numerals in the windows should indicate the guard frequency after the receiver-transmitter finishes channeling.

4-74. Perform the following preoperation tests, referring to Figure 4-51 for location of components:

a. Set the VOLUME control on Radio Set Control C-628/ARC-27 to maximum clockwise position.

b. Set the TONE-VOICE switch on Radio Set Control C-626/ARC-27 to the VOICE position.

c. Turn GUARD-BOTH-COMD T/R switch to the COMD T/R position.

d. Connect an HS-33 headset (Table 4-54) to PHONES jack on front panel of Receiver-Transmitter RT-178/-ARC-27.

e. Connect a T-17 microphone (Table 4-54) to MIC. jack.

f. Connect a TS-80/U test meter (Table 4-54) to METER jack.

g. Check the operation of the main receiver by depressing the SQ OFF MAIN REC switch. If operating normally, the hiss characteristic of the receiver should be heard in the headphones. If hiss is heard before depressing the switch, readjust the MAIN REC SENS control by slowly turning counterclockwise until hiss "plops" out.

h. Turn GUARD-BOTH-COMD T/R switch on Radio Set Control C-626/ARC-27 to the GUARD position.

i. Check the operation of the guard-channel receiver as in step "g" by depressing SQ OFF GUARD REC switch and, if necessary, readjusting GUARD REC SENS control.

j. Set the GUARD-BOTH-COMD T/R switch to the BOTH position.

k. Place the meter switch on front panel (center) of receiver-transmitter to the I_{ANT} position.

l. Depress the push-to-talk switch on the microphone; the meter should read at least 0.20 on all channels. Side tone should be heard in the headset, and meter reading should increase approximately 20 percent on voice peaks when the carrier is modulated.

m. Set the TONE-VOICE switch on Radio Set Control C-626/ARC-27 to the TONE position; the meter should read approximately 0.24 and a 1,020-cps tone should be heard from the headphones.

n. Return TONE-VOICE switch to VOICE.

o. Repeat steps "g" and "l" on all channels.

p. Check meter readings, depressing the push-to-talk switch to transmit and releasing the switch to receive. For satisfactory operation, meter readings should agree with Table 4-56.

4-75. Radio Set AN/GRC-32B (Modified) should now be in condition for two-way radiotelephone communication from the local (equipment-room) position. At this time an operation test of the uhf equipment may be made by establishing two-way radiotelephone communication between the equipment-room operator and an operator in the control-tower cab. At one station, use the remote transmitter and receiver equipment controlled from the console in the control-tower cab. At the other station, use the standby equipment (Radio Set AN/GRC-32B) controlled from the equipment room.

NOTE

Headphone volume can be adjusted only with the VOLUME control on Radio Set Control C-628/ARC-27 in the control-tower cab.

4-76. Remove the headset, microphone, and meter from the receiver-transmitter, and test the remote-control position in the control-tower cab as follows:

TABLE 4-56

METER READINGS, RADIO SET AN/GRC-32B (MODIFIED)

Component	Meter Used	Switch Position	Function	Meter Reading	Factor	Corrected Reading
Receiver-Transmitter RT-178/ARC-27 (Receive)	TS-80/U	E_{IN}	Supply Voltage	.48-.58	x50	24-29V
		I_B	Total B+ Current	.26-.28	x1000	260-280 ma
		MOD I_K	Modulator Cathode Current	0		0
		DRVR I_G	Driver Grid Current	0		0
		FINAL I_G	Power Amplifier Grid Current	0		0
		I_{ANT}	R-F Output	0		0
Receiver-Transmitter RT-178/ARC-27 (Transmit)	TS-80/U	E_{IN}	Supply Voltage	.48-.58	x50	24-29V
		I_B	Total B+ Current	.40-.45*	x1000	400-450 ma
		MOD I_K	Modulator Cathode Current	.20-.25*	x200	40-50 ma
		DRVR I_G	Driver Grid Current	.15-.20	x100	15-20 ma
		FINAL I_G	Power Amplifier Grid Current	.3-.5	x100	30-50 ma
		I_{ANT}	R-F Output	.20 min	x50	10 watts
Power Supply PP-894/GRC-32B	Front-Panel Voltmeter	POWER ON	Power Supply Output Voltage	24-29	x1	24-29V

*Modulated approximately 30 percent.

a. Turn the LOCAL-REMOTE switch on Radio Set Control C-626/ARC-27 to the REMOTE position.

b. Connect the microphone to its jack in the emergency panel in the control tower cab supplementary cabinet used for local standby remote control equipment.

c. Set the microphone switch to the uhf position.

d. Set the OFF-T/R-T/R+G REC-ADF switch on Radio Set Control C-628/ARC-27 to the T/R+G REC position.

e. Rotate the CHANNEL switch to position 1.

f. Check the numerals in the MEGACYCLES windows on Radio Set Control C-626/ARC-27. These should indicate the desired frequency of channel 1 (step "h," par. 4-73).

g. Depress the microphone push-to-talk switch and speak "across" (not directly into) the microphone. Side tone should be heard from the headset.

h. Set the CHANNEL switch to positions 2 through 18 and to position G, in turn, and repeat steps "f" and "g" for each position.

NOTE

> When turning the equipment off, use the POWER ON-OFF switch on Power Supply PP-894/-GRC-32B. Do not use the OFF position of the OFF-T/R-T/R+G REC-ADF switch. In extremely cold weather, this switch should be used to allow the power supply to warm up for a minute before connecting the load, when the LOCAL-REMOTE switch on Radio Set Control C-626/ARC-27 is set to REMOTE.

4-77. RADIO RECEIVER BC-624-C, RADIO TRANSMITTER BC-625-AM. (Fig. 4-52 and 4-53.) Adjust and test Radio Receiver BC-625-C, Radio Transmitter BC-625-AM, and associated equipment, according to the procedures given below.

4-78. If the transmitter cover is closed, loosen the fasteners that pin it to the outer cover. Raise the cover slightly, and slide it away from the tuning controls.

NOTE

> During the tuning procedure do not remove the transmitter-receiver assembly from Case CS-80-A. The additional capacitances introduced by replacing the assembly in the case will tend to disturb the tuning adjustments.

4-79. Referring to Figure 4-53, proceed to tune the transmitter section, then the receiver section, as follows:

a. Install transmitter crystals of the desired frequencies in the crystal sockets (A, B, C, D), preferably with the lowest frequency at channel A, next higher at channel B, next higher at channel C, and highest at channel D.

NOTE

> The crystal chosen for any transmitter channel should have a rated fundamental frequency one-eighteenth of the desired output frequency. (Fundamental frequencies appear on the crystal holders.)

b. Make certain the antenna cable plug is securely connected to the antenna receptacle (SO-153, Fig. 4-53).

c. Make certain the send-receive switch on Radio Control BC-1314 in the control-tower-cab supplementary cabinet is in the receive position and that Radio Control BC-1312 with its remote control cable is securely connected to the 18-contact receptacle (417, Fig. 4-53).

d. Make certain Rectifier RA-62-C is securely connected to the 12-contact receptacle (420, Fig. 4-53).

NOTE

> With the following exceptions Rectifiers RA-62-A, RA-62-B, and RA-62-C are identical and completely interchangeable:
>
> (1) Rectifier RA-62-A is supplied with a shock-mounted base to cushion the unit against excessive vibration. Rectifiers RA-62-B and RA-62-C are not so equipped.
>
> (2) Rectifiers RA-62-A and RA-62-B are equipped with a nonlocking a-c input connector. No provision is made to prevent the line cord connector from becoming loose or disengaged on these units. Rectifier RA-62-C, however, is equipped with a twistlock receptacle to insure positive contact.
>
> (3) Most Rectifiers RA-62-C use hermetically sealed transformers and chokes, whereas all Rectifiers RA-62-A and RA-62-B and some Rectifiers RA-62-C do not use sealed units.
>
> (4) On some units the marking MFP and a date giving the month and the year appears. Units so marked have been moisture and fungus proofed.

e. Set the voltage selector switch on the rectifier to the proper line voltage (115V).

f. Set the power ON-OFF switch on the rectifier to ON.

g. Place the transmitter METER SWITCH in position 3.

h. Plug the cord of Test Set I-139-A (part of Test Equipment IE-19-( ), Table 4-54) into the test-meter receptacle (171) on the transmitter.